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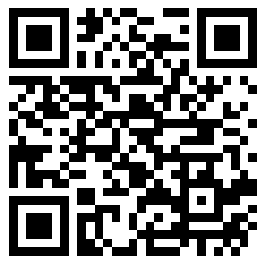

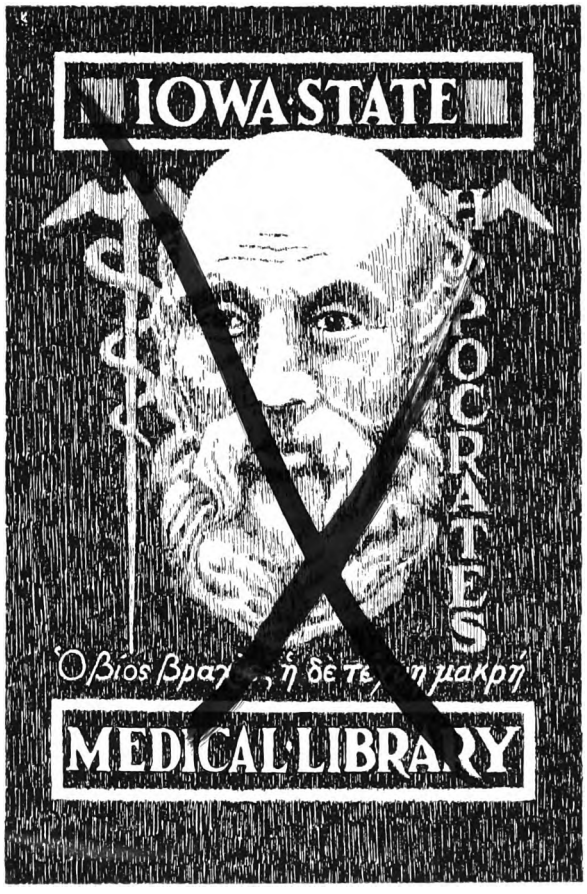

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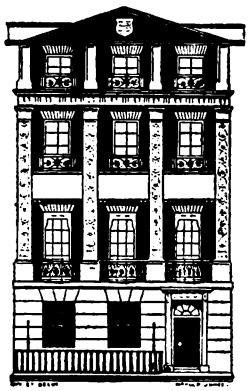

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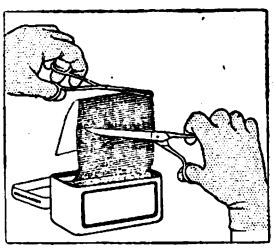

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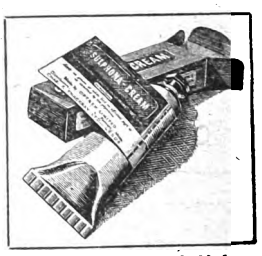

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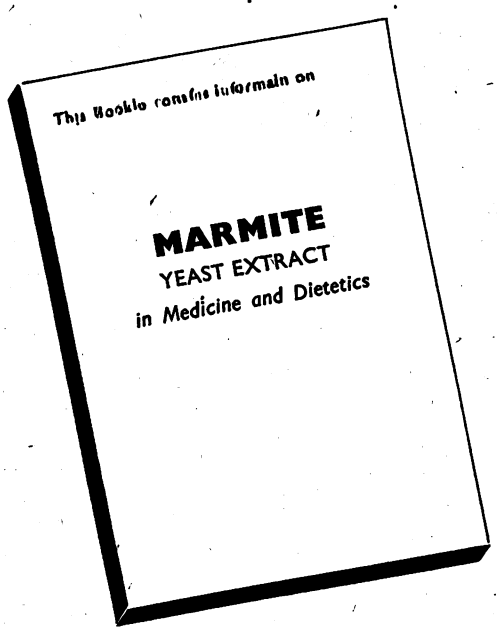

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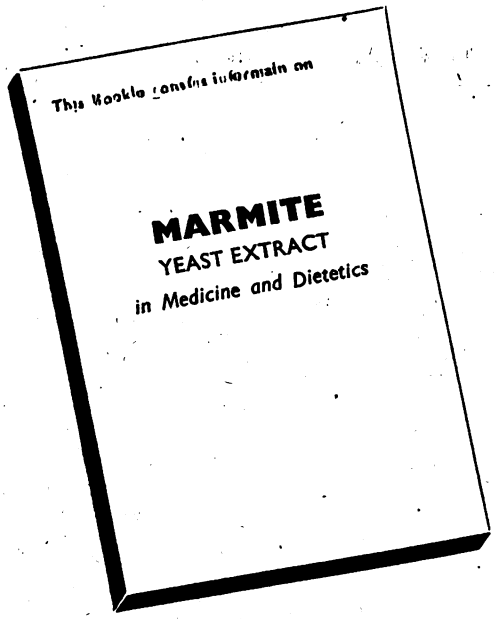

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H. L. SHEEHAN
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MANY people assume that shock in women during childbirth differs completely from shock in other patients; so much so, that it is often excluded entirely from consideration in discussions on shock in general. This assumption appears to be quite unjustified. Apart from the details of its ætiology, shock in obstetrics seems to be, clinically and pathologically, the same as shock in other types of case.

The present observations are based on the clinical study and post-mortem examination of 147 fatal cases of shock in relation to labour at Glasgow Royal Maternity Hospital, and on the clinical study of many other shocked women who recovered. The deaths occurred within 2–18 hours of the onset of the shock. Many of the patients who died of shock had also had hæmorrhage, which was sometimes serious; but patients who died essentially as a result of hæmorrhage—e.g., from placenta prævia, and very severe postpartum hæmorrhage—are not included. These 147 cases form about a third of the necropsies carried out in ten years at Glasgow Royal Maternity Hospital by me or my deputies, Dr. A. M. Stewart and Dr. M. D. Crawford. Some of these cases were the subject of a previous paper (Sheehan 1939).

Shock has been reviewed recently by Moon (1938), Harkins (1941), Wiggers (1942), McMichael (1945), and Wilson (1946); but astonishingly little has been published on the pathological lesions (see Wiggers 1942). Most of these papers deal with the post-mortem appearances in anæsthetised experimental animals, and the lesions described fall into three main groups:

(1) Gross congestion of intestinal mucosa, with blood-stained fluid in the lumen of the gut.
(2) Free fluid in the pleural and peritoneal cavities.
(3) What are sometimes referred to, in a sweeping generalisation, as "multiple petechiæ scattered throughout the organs and serous membranes."

It may be observed, however, that these are the lesions of animals kept under anæsthesia and have practically no relation to the pathological changes seen in the shocked human being.

One of the main difficulties about ordinary necropsies on human patients is that the examination is usually delayed until various post-mortem changes have taken place. The blood has clotted and rigor mortis has developed. The movement of fluids after death produces artificial congestion and œdema of the lungs and other organs; autolysis produces softening of the spleen and adrenal medulla and accounts for most of the "cloudy swelling" of the kidneys seen in delayed necropsies. These changes have been avoided in the present series by carrying out the examinations as early as possible after death. The great majority of these necropsies were done within an hour, and many of them within 15–30 minutes, after death. The organs and tissues were examined and handled with the greatest care, and special fixatives were used suitable for hot material. Occasionally examinations were delayed to two hours or even longer after death, but in these cases any conditions which could be simulated by post-mortem changes have been discounted.

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Clinical evidence suggests a very great reduction in the rate of blood-flow through the skin, muscles, and abdominal viscera. During life this is most obvious in the skin, which is either very pale or, in more advanced shock, often shows a blotchy cyanosis, particularly over the thighs. If the blood is squeezed out of the skin capillaries, it flows back into them extremely slowly after the pressure has been released.

The normal warmth of the skin is due to blood circulating through it. In shock there is so little cutaneous blood-flow that the temperature of the skin falls to about that of the surrounding air and the skin feels cold.

The opposite aspect of the same principle is equally well known. In a healthy person heat applied to the skin—e.g., with a warm hot-water bottle—is carried away very rapidly by the blood and does no local damage. In a shocked patient, on the other hand, the cutaneous blood-flow is slow and the normal local reflexes are lost, with the result that the skin vessels do not dilate in response to heat—there is insufficient circulation through the skin to carry away the heat from a hot-water bottle. Consequently the skin is raised to the temperature of the hot-water bottle and is burnt, producing the blisters rather commonly seen in these patients at necropsy. Such burning may be regarded as a test of inadequate local circulation.

Blood-flow in Muscles

There is relatively little evidence about the blood-flow through muscles. It is, however, an everyday observation that the superficial arm veins in the shocked patient are so contracted that it is often difficult to collect samples of blood from them, and very high pressures are needed to transfuse fluids into the veins. If the deep veins of the limbs are similarly contracted, the blood-flow through the muscles must be very slow. The rate of blood-flow through the deep veins of the limbs of shocked patients does not seem to have been measured; but Freeman et al. (1936) have produced plethysmographic evidence that the blood-flow through the limbs is very considerably reduced in shocked patients, and there is a correspondingly low oxygen content in the venous blood from the limbs.

Blood-flow through Abdominal Viscera

Skin and muscles are perhaps not vital organs, and the circulation through the abdominal viscera is probably of greater interest. The only direct evidence on this point concerns the liver, and it is based on only a single observation, though an important one. As has just been emphasised, the burning of the skin by an ordinarily warm hot-water bottle indicates that the skin blood-flow must be slow. The following case gives an interesting extension of this principle.

In a badly shocked patient we put an electric blanket over the right side of the body. About half an hour later blistering of the skin all over the lower ribs and hypochondrium was found; so the electric blanket was removed at once. This blanket was not very hot; I pressed it firmly against my face for a long time without any discomfort whatever. The patient was conscious at this stage but died about three hours later, the cause of death being the original shock. At necropsy there was a very striking and significant condition: under the area of blistered skin the surface of the liver was cooked to a depth of about $^1/_2$ in., except where it had been protected by ribs (fig. 1).

The only adequate explanation is that in this patient the blood-flow through the liver had been too slow even to carry away the heat which passed through the abdominal and thoracic wall. Not only does this unintentional experiment indicate that the blood-flow through the liver of this shocked patient was very slow; but a slow blood-flow through the liver clearly implies that the blood-flow through the entire portal system must also have been very slow.

There is some indirect evidence that the renal blood-flow is also cut down very greatly. The renal clearance-

* A paper read at the Rotunda Hospital Bicentenary International Congress, Dublin, in July, 1947.

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rates are greatly reduced in moderately shocked patients, and there is absolute anuria in severely shocked patients. Often the patient has passed no urine during the several hours from the onset of shock, and the bladder is empty post mortem.

Effects of Slowed Blood-flow

The reduction of the rate of blood-flow to most of the body is naturally associated with a reduction of general metabolism, as shown by the fall of body temperature and the reduced rate of oxygen usage by the body as a whole. It is, however, important not to exaggerate the slowness of the blood-flow through the abdomen and limbs. It is a slowness of flow, not a complete arrest. Some blood certainly flows down the abdominal aorta even in very severe shock. This is easily shown by manual compression of the upper abdominal aorta, which produces a definite rise of blood-pressure in the upper parts of the body, even in moribund patients. Further, the blood-flow to the various parts of the body is sufficient to maintain the life of the tissues; there is no necrosis apart from a special exception mentioned below. Human beings do not develop the necrosis of intestinal mucosa which is found after protracted experimental shock in certain animals.

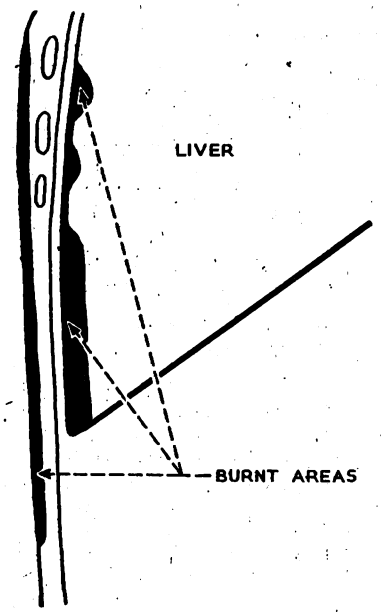

Fig. 1—Extent of burning of skin and surface of liver in shock (condition of intervening parietal wall was not obvious at necropsy).

In striking contrast to this evidence suggesting a very considerable reduction in the blood-flow to most of the body, there is the very significant fact that the patient remains conscious until the terminal stages of shock. This can only mean that the blood-flow to the brain remains relatively good.

Thus in shock it seems that the blood from the heart passes into one or other of two functionally distinct circuits which have very different circulation-times, though the rates have not yet been measured:

(1) A high proportion of it goes to the brain and passes rapidly through the cerebral circulation back to the right heart. The rate of blood-flow through this circuit may well be almost normal, except in dying patients.

(2) The remainder (a much lower proportion than normal) is distributed to the rest of the body and circulates very slowly through the vessels until it reaches the right heart and mixes with the rapid current of blood returning from the cerebral circuit.

DISTURBANCES OF CARDIAC FUNCTION

The reduced rate of blood-flow through the greater part of the body, even though the cerebral blood-flow remains normal, leads to a reduction in the total amount of blood returning through the veins to the right heart each minute, with a corresponding failure to fill the right auricle adequately. The reduction of pressure in the right auricle has been measured in shock in human beings (though it has not yet been measured in shock in obstetric patients) by Cournand et al. (1943) in New York—an excellent piece of team-work well summarised by Richards (1944). The figures in this paper, which have been taken from their detailed data, have been calculated to give a simplified general picture. Cournand et al. found that the right auricular pressure in shock was 5–8 mm. of water, compared with 30–35 mm. in normal patients. This low return of blood to the right heart is reflected in a low output of blood from the left heart. They also found that in shocked patients the cardiac output was only about 3 litres a minute, compared with the normal of about $5^1/_2$ litres a minute. These figures can easily be calculated to stroke output. In shock the pulse-rate may go up to 150 or more (the vasovagal reaction seems to be very rare in obstetric patients). This means that in severe shock the left ventricle puts out only about 20 ml. per beat instead of the normal figure of about 75 ml.

This low output of blood from the left ventricle with each heart beat should lead to a lowering of the pulse-pressure wave in the arterial system. There are, however, two other factors: (1) the vasoconstriction in most of the body tends to raise the pulse-pressure wave; and (2) the continuance of good blood-flow through the cerebral vessels tends to lower the pulse-pressure wave. In practice the interaction of these three factors produces a low pulse-pressure, which is one of the early signs of shock. Drs. Stewart and Crawford, at Glasgow, made sphygmomanometer observations on patients developing obstetric complications which might be expected to lead to shock. Thus they were able, in those patients who actually became shocked, to obtain records of the blood-pressure changes from before the first onset of shock right through to the fully developed stage. They found that the first change was a fall in the pulse-pressure; the systolic blood-pressure was maintained, but the diastolic pressure gradually increased. After a variable period of this condition the systolic and diastolic pressures fell together, sometimes gradually but sometimes very quickly, to the low figures commonly seen in fully developed shock.

This fall of the diastolic and systolic pressures may in theory be due to a failure of the vasoconstriction, or it may be due to inefficiency of the heart. There is certainly one very characteristic anatomical change in the heart in shock which may have a possible bearing on the problem (fig. 2). In the great majority of deaths from shock in obstetrics sub-endocardial hæmorrhages are found over a particular area of the left side of the interventricular septum, about 2 or 3 cm. below the aortic cusps (Sheehan 1940). In severe cases these may extend from their primary site to further down the septum and on to the base of the musculæ papillares of the left ventricle, but they are not found beneath the endocardium of other parts of the heart, and they are not accompanied by sub-pericardial hæmorrhages. They lie over the distribution of the left branch of the auriculoventricular bundle, and in their vicinity the Purkinje fibres can often be seen microscopically to be peculiarly swollen. Their incidence in obstetric necropsies is shown in table I. They were present in over three-quarters of the shock

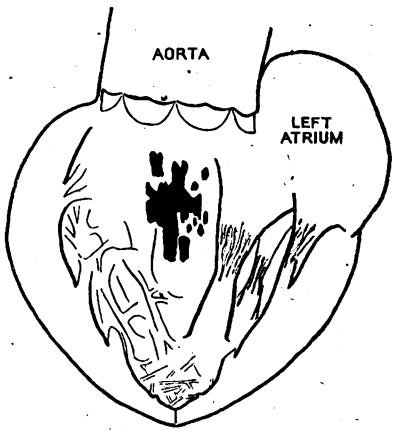

Fig. 2—Subendocardial hæmorrhages on left side of interventricular septum in shock.

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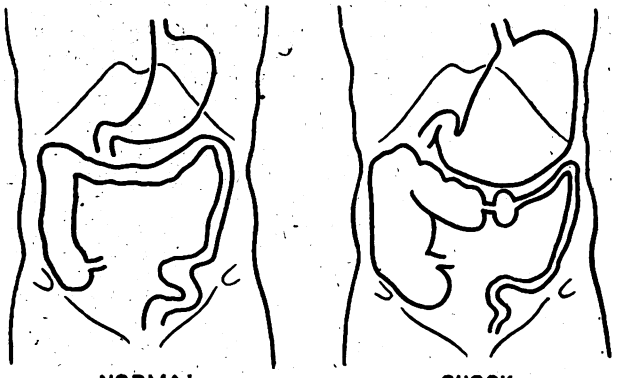

Fig. 3—Dilatation of stomach and proximal colon in shock.

deaths and were usually large. They were also found, though usually smaller, in about a third of the patients who died of severe acute cerebral disturbances, such as cerebral hæmorrhage, eclampsia, and fractured skull. They were only rarely found in other deaths, and these were usually cases of acute intestinal obstruction, in which there may be a shock element.

As yet we have no definite information about their functional significance or about the particular coronary mechanism that produces them, but they are obviously a very specific lesion and related to the basic physiological disturbance of shock. They have been present in most cases of shock in non-pregnant human patients that I have examined. They are not merely terminal lesions. If a human patient survives severe shock but dies a few days later, there are often fading subendocardial hæmorrhages on the left interventricular septum. And in experimental shock in animals the same hæmorrhages can often be found if the animal is killed a few hours before it would have died of shock.

DISTURBANCES OF THE NERVOUS SYSTEM

There are no obvious anatomical lesions in either the sympathetic or the central nervous systems in patients dying of shock. Nevertheless in shock many of the functional disturbances which can be recognised during life, or whose effects can be seen after death, appear to be of nervous origin (Freeman et al. 1938). Pallor of the skin, sweating, tachycardia, vasoconstriction, and possibly the absence of cutaneous vasomotor reflexes suggest sympathetic overactivity.

Further, there is commonly a rather characteristic change in the alimentary tract which appears to fall into the same category. Clinically, in severe shock the patient often develops a large epigastric swelling, which is particularly obvious in a woman soon after delivery. This is due to a great distension of the stomach; post mortem the stomach fills the upper abdomen and is tense with gas. Among 46 shocked patients the dilatation was great in 25, moderate in 13, and absent in 8. The small intestine is not strikingly abnormal, but there is a great gaseous distension of the cæcum, ascending colon, and half the transverse colon. This dilatation ends sharply about midway along the transverse colon, sometimes with a short hour-glass segment of contracted gut near the end of the dilated portion (fig. 3). The rest of the colon is firmly contracted. The distribution of the dilatation corresponds exactly to that of the sympathetic nerve-supply, and it is well known that overactivity of the sympathetic relative to the parasympathetic can produce dilatation of the stomach and proximal colon. The dilatation of these parts of the alimentary tract in shock is probably only a symptom of the nervous disturbance; relief of the gastric distension with a stomach-tube does not affect the patient's condition.

In this connexion it may be recalled that the subendocardial hæmorrhages occur not only in shock but also with certain acute irritative lesions of the brain. Possibly there may be a common factor. However, there is no evidence yet that the subendocardial hæmorrhages in acute cerebral disturbances are in fact due to a sympathetic discharge produced by hypothalamic stimulation.

The most peculiar phenomenon about the central nervous system in shock is that, though the patient appears mentally normal, the conscious perception of pain seems to be very much dulled or absent. This is obviously of considerable significance, though not yet explained.

LESIONS OF OTHER ORGANS

The question of reduction of blood-volume is dealt with below, but short consideration may be given here to the post-mortem evidence on this matter. Obviously the distribution of the blood after death is not a reliable criterion of where it was during life, but it is worth noting that, however quickly the examination is made after death, there is never any recognisable pooling of blood in muscles, abdominal viscera, or elsewhere. What is of much greater importance, surgeons who operate on shocked patients are equally unable to recognise pooling

TABLE I—INCIDENCE OF SUBENDOCARDIAL HÆMORRHAGES IN 278 OBSTETRIC NECROPSIES AT G.R.M.H. 1935–43

Cause of death	No. of cases with subendocardial hæmorrhages			
	None	Small	Medium	Large
Shock	20	29	24	23
Cerebral lesions and eclampsia..	31	11	4	6
Other conditions..	123	5	0	2

of blood in any specific locality. This, of course, does not exclude a generalised pooling.

As regards local accumulation of plasma fluid, the evidence obtained from immediate necropsies is, however, quite valid. This evidence is essentially negative. There is no free fluid in serosal spaces. The lungs are usually dry; in a third of the cases in the present series the two lungs together weighed less than 550 g., and in another third they weighed less than 750 g. In a few cases there is some parametrial œdema, but the amount of this is not more than 300 g. in the severest cases. There is no œdema of muscles or subcutaneous tissues as a result of shock, though there may be much œdema in patients with toxæmia of pregnancy. This absence of local pooling of plasma fluid must not be taken to imply that there is not a general pooling. If a litre of plasma fluid were distributed evenly throughout the body, it would not be recognisable at necropsy.

Lungs.—These do not usually show any significant changes. I have not personally observed emboli either of fat or of amniotic-fluid debris. Occasionally there are multiple petechial hæmorrhages in the lung substance, and very occasionally similar lesions are seen on the diaphragm, but their significance is not yet clear.

Liver.—There is no abnormal congestion recognisable to the naked eye in the livers of shocked patients. When the shock has lasted a few hours, there are sometimes peculiar microscopic areas of acute congestion at the centre of the liver lobules. These form thin flares radiating in a narrow segment from the centrolobular vein and extending out perhaps a third or a half of the diameter of the lobule. They are very variable and irregular in incidence and are presumably an effect of the vascular disturbance of shock. There is no satisfactory evidence about whether they occur in mild shock or only when

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the patient has reached "irreversible shock." Certain authors have reported centrolobular necrosis of the liver in shocked patients, but this cannot be accepted as part of the pathology of shock. It is seen in various obstetric conditions and is more common in patients who have not had shock than in those who have been shocked.

Suprarenal Glands.—These show no significant lesions in shock. Further, there is some pathological evidence against the view that acute functional insufficiency of the suprarenal cortex plays a part in causing shock. Necropsy on obstetric patients sometimes reveals a gross hæmorrhagic necrosis of the suprarenal glands which has produced acute destruction of most of the cortex. If any patients ever develop acute suprarenal deficiency, these patients certainly ought to do so. In point of fact, they tend to die suddenly and unexpectedly fairly soon after the onset of the lesion, but of 12 patients at Glasgow with these suprarenal lesions not one developed clinical symptoms in any way suggesting shock. It is thus very difficult to accept the hypothesis that shock is caused by suprarenal cortical insufficiency.

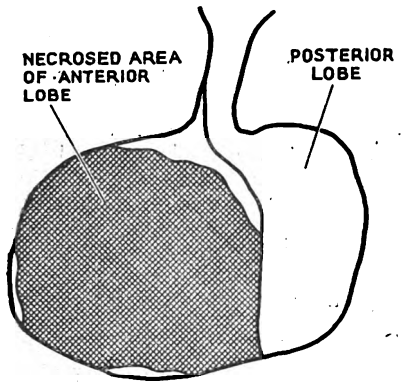

Fig. 4—Large necrosis of anterior pituitary gland after severe shock in obstetrics.

Anterior Pituitary Gland.—If, at the termination of pregnancy, an obstetric patient suffers severe prolonged circulatory collapse, as a result either of shock or of hæmorrhage, or of a combination of the two, a thrombosis commonly develops in the vessels to the anterior lobe of the pituitary gland. This produces ordinary anæmic infarction of the anterior lobe (fig. 4). The lesion takes twelve hours or more to become easily recognisable on microscopy, and the early stages cannot be identified with any confidence if the patient dies within a few hours of the onset of the shock. The histologically obvious stage of the acute necrosis is seen in patients who have been shocked at labour, have survived the stage of shock, and have died from some other cause a day or several days afterwards. The extent of the necrosis depends on the severity of the circulatory collapse (table II). Normally the shock or hæmorrhage occurs at about the time of delivery, but there have been two cases reported of pituitary necrosis originating in severe shock due to obstetric conditions which caused the death of the fœtus in utero, though the dead body of the fœtus was not delivered for another day or two. As is obvious from the time relationships and from the variety of obstetric causes which may produce the shock, the pituitary necrosis is a result of shock, not the cause of shock. Its only serious immediate effects seem to be that the patient has a tendency to hypoglycæmia and a complete failure to lactate. Many of these patients with pituitary necrosis do not develop fatal illnesses in the puerperium, and thus the early stage of the lesion is not observed pathologically. They go on living for 10, 20, or 30 years more and during that time develop evidence of chronic hypopituitarism if the necrosis was large.

PHYSIOLOGICAL DISTURBANCES IN SHOCK

At this point it seems unfortunately necessary to introduce certain theoretical concepts as a framework for what up to now may appear a jumble of disconnected pathological facts. The evidence considered previously suggests that in shock there is a general vasoconstriction throughout most of the body except the brain. These circulatory changes are very similar to those which occur in a patient who has had a severe hæmorrhage. In such a patient the blood-volume has been sharply reduced, and it may be taken that the vasomotor defence mechanism has a beneficial purpose—the conservation of the remaining blood for circulation through the brain by cutting down the circulation to the less vital parts of the body. The mechanism ceases to operate as soon as the blood-volume has returned to something approaching normal.

In pure shock, on the other hand, the body appears to bring this defence mechanism into very powerful and protracted action to deal with a severe hæmorrhage which has not in fact occurred. The apparently purposeless operation of this mechanism, if long continued, is always harmful and sometimes fatal; it cuts down the blood-flow to many important viscera and so seriously reduces the venous return to the heart as to lead to a particular type of cardiac failure. It is open to question whether, in these circumstances, attempts to stimulate the vasoconstrictor mechanism still further—e.g., with adrenaline or pituitary extract—have a rational basis. If the fall of blood-pressure is due to a diminished venous return to the heart, any success in increasing vasoconstriction should, in theory, merely intensify the vicious spiral.

There are three standard explanations for the coming into play of this vasomotor mechanism in shock:

(1) *Biochemical Substances Liberated into the Circulation from Traumatised Areas.*—Interest in this aspect had waned previously as a result of evidence accumulating against the histamine hypothesis, but it has revived recently as a result of work on the "crush syndrome" and on adenosine triphosphate (Green 1945). The matter, though not in any way dismissed from consideration, cannot be profitably discussed here, since no original observations on this line have been made in the present study.

(2) *Prolonged Sympathetic Discharge.*—As has been shown, there is evidence suggesting much sympathetic overactivity in shock, but it is not yet clear whether this sympathetic overactivity is merely one aspect of the general disturbance of shock or its fundamental cause. If it is the cause, one is driven back to the unanswered question of whether the sympathetic overactivity is due to biochemical substances or to central-nervous-system stimuli or to afferent sympathetic stimuli.

(3) *Reduction of Blood-volume.*—Certainly in many cases of shock there has been an associated loss of blood or of plasma, but the evidence is not yet conclusive that a reduction of blood-volume is a necessary prerequisite for shock. Most of the pre-war opinions about blood-volume in shock were based on hæmatocrit examination of blood from the skin or from arm veins. Such estimations are obviously open to very many objections in patients with very slow blood-flow in the

TABLE II—INCIDENCE OF NECROSIS OF ANTERIOR PITUITARY IN 373 OBSTETRIC NECROPSIES AT G.R.M.H. 1935–46

Degree of hæmorrhage and shock	No. of cases with pituitary necrosis			
	None	Small	Medium	Large
None	215	0	0	0
Slight	13	6	0	0
Moderate	19	3	5	7
Severe	4	1	2	15
Fatal within 12 hours	83 cases too early for recognition of pituitary lesions			

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skin capillaries and arm veins. The really valid evidence on this matter comes again from Cournand et al. (1943) who collected their blood samples from the right auricle and the femoral artery. They worked with shocked patients of various types, but unfortunately not with obstetric patients. The patients in Richards's (1944) summary of their work fall into two main groups:

(*a*) Shock due to hæmorrhage or to severe limb damage, presumably with much local blood-loss. These patients had a blood-volume of about $3^1/_2$ litres instead of the normal 5 litres, and an average hæmatocrit reading of 33% instead of the normal 40–45%. This suggests that these patients had lost about $2^1/_2$ litres of whole blood and had then transferred about a litre of tissue fluid into their vascular system.

(*b*) The second group were patients with shock due to acute abdominal injuries with much peritoneal effusion due to an early traumatic peritonitis, and shock due to burns in which there had presumably been much plasma-loss through the burnt surface. This group had a blood-volume of about 4 litres and a hæmatocrit of 50%, which suggests that these patients had lost about a litre of plasma fluid at the local lesions.

In shock due to obstetric conditions in which there has been much hæmorrhage, the blood-volume and hæmatocrit should probably be the same as in Richards's hæmorrhage group. Unfortunately we have no information yet about the blood-volume in pure shock in obstetrics—i.e., when there has been little or no hæmorrhage. The whole matter is complicated by three facts: (1) Crawford (1940) has shown that in ordinary labour and particularly in toxæmic labour there is often a very considerable transitory loss of plasma fluid from the blood without any shock developing; (2) Freeman (1933) has produced experimental evidence that vasoconstriction can produce a reduction of blood-volume; and (3) vasoconstriction may produce a local or a diffuse internal pooling of blood that may not be estimated in ordinary measurements of blood-volume.

TABLE III—EFFECT OF BLOOD-TRANSFUSION AT G.R.M.H. 1930–35 AND 1936–41

Clinical type	No. of deaths	
	Control period	Transfusion period
Hæmorrhage alone	19	2
Hæmorrhage with some shock..	32	21
Shock with some hæmorrhage ..	43	41
Shock alone	49	52

Summarising our present knowledge on this matter we may say that we do not know for certain whether or not there is a reduction of blood-volume in pure shock as seen in obstetrics; and, if there is any reduction of blood-volume, we do not know whether it is caused by the shock, or whether it causes the shock, or whether it has any significant effect.

BLOOD-TRANSFUSION IN SHOCK

The hypothesis outlined above suggests that hæmorrhage and shock both lead to the same vasomotor defence mechanism, but that in hæmorrhage the mechanism acts purposively and beneficially under the stimulus of a sudden reduction of blood-volume, whereas in shock it is set into action purposelessly and harmfully by some as yet unascertained stimulus, possibly nervous or biochemical. The view that the stimulus in shock may be a reduction of blood-volume is not supported by the effect of blood-transfusion in this condition. This conclusion is based on a controlled study of the results of transfusion at Glasgow Royal Maternity Hospital (Sheehan 1942). There was a fairly steady annual intake of patients, with the same type and severity of complications arriving in the same numbers each year. For the six years 1930–35 there were only 25 blood-transfusions in the hospital; hence this period may be used as a satisfactory "no transfusion" control period. In the six years 1936–41 there was an active and very efficient blood-transfusion service run by the hospital, and an intensive drive on transfusion was made by the staff (Black 1937). During this period almost every patient suffering from shock or hæmorrhage was given blood-transfusion very early and in apparently adequate amount. The total number of transfusions was about 800, and the average amount of blood given was over 1000 ml. (this includes many small transfusions in trivial cases, but seriously ill patients were often given 2 litres or more, and one patient recovered from very severe hæmorrhage as a result of the administration of 13·5 litres of blood in three hours). In each period there were, so far as can be judged, the same number of patients with shock or hæmorrhage; the only differences between the two periods were the introduction of transfusion and the improvement in the treatment of placenta prævia. The comparison between the death-rates in the two periods is shown in table III.

TABLE IV—MIXED AND CONCEALED ACCIDENTAL HÆMORRHAGE AT G.R.M.H. 1932–43

Parity	Total deliveries	Accidental hæmorrhage	
		Total cases	Shock deaths
1..	15,300	132	6
2 and 3 ..	12,600	177	7
4 and 5 ..	5600	121	8
6 and over ..	5100	270	30

The deaths from hæmorrhage in the six-year transfusion period were negligible, as compared with such deaths in the control period.

The deaths from hæmorrhage complicated by shock show some improvement as a result of the transfusions, but the difference is not highly significant. It is, however, important to note that patients saved from death from pure hæmorrhage in the previous group were potential candidates for subsequent death in this group.

The deaths from shock with minor hæmorrhage, or from shock alone, remain unaffected by all this intensive blood-transfusion drive.

These figures are from only one hospital. I have been unable to find published reports of any other controlled investigation either in obstetric patients or even in traumatic shock. Nevertheless, so far as these figures go, they lead to the following three conclusions:

(1) Blood-transfusion is a life-saving measure in obstetric patients with severe hæmorrhage. Prompt and adequate transfusion should prevent almost all the hæmorrhage deaths in maternity hospitals.

(2) Blood-transfusion appears to be of value in obstetric patients with a mixture of shock and significant hæmorrhage. It should certainly always be given in this condition, just as it is given to wounded soldiers suffering from the combined effect of blood-loss and shock.

(3) But in obstetric patients with shock alone, or with shock and only a minor degree of hæmorrhage, there is no evidence that blood-transfusion is of any value whatsoever in saving the lives of the patients.

One further fact remains to be mentioned. Even in pure shock in obstetrics there is usually some clinical improvement immediately after beginning the transfusion, though unfortunately the improvement is often only transient. There are two possible explanations for the improvement: (1) an artificial raising of the pressure in the right auricle; and (2) the compensation of a slight volume shunt from the cerebral circuit to the

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slow general circulation. The problem is not yet solved; it is difficult to explain the effect produced by adding a very small trickle of blood to the 3 litres of blood going to the right auricle each minute in shock.

OBSTETRIC FACTORS CAUSING SHOCK

The obstetric conditions involved in shock deaths in this series of patients were as follows:

SHOCK DEATHS IN 451 OBSTETRIC NECROPSIES AT G.B.M.H. 1935–45

Dystocia:	
Prolonged labour	46
Rupture of uterus	20
Third Stage:	
Retained placenta	30
Placenta accreta	5
Inversion of uterus	2
"*Toxæmia*":	
Concealed and mixed accidental hæmorrhage	25
Hypertension	6
Other Conditions:	
Cæsarean section	8
Complicating diseases	5

In all these groups there are the general pathology findings of shock as already described. All that need be considered here are the clinical aspects and the specific pathology of the various conditions.

Dystocia.—The prolonged-labour group is the largest. The primary factor here was disproportion; the average weight of the babies was over 9 lb., and possibly many of the cases could be classified in the dystocia-dystrophia syndrome (Williams 1942). Labour was always prolonged (2–4 days or even more) and the first stage unsatisfactory. Delivery was always artificial and per vaginam. Death was due to pure shock with little or no hæmorrhage. Three-quarters of the patients were primiparæ, and these usually died after delivery; the multiparæ usually died undelivered. Pathologically these patients always have a bruised, and often pulped, trigone, sometimes with an early ascending pyelonephritis. They always have a considerably raised level of non-protein nitrogen in the blood (Crawford 1939). Also they have usually been in acidosis during the labour as a result of starvation, vomiting, and long-continued muscular activity (these are the patients who invariably develop delayed chloroform poisoning if given even a small dose). The uterus is usually larger than normal and may show some œdema both in its wall and in the parametrium.

Rupture of the uterus is made up of two equal groups. The first group were patients with large babies, averaging 9½ lb. in weight as in the previous group, and the rupture was caused by intra-uterine manipulations, such as version, rather than by instrumental delivery. In the second group the rupture was spontaneous and the baby of normal size. The patients in both groups were all multiparæ. The rupture was nearly always lateral and in the lower segment. Usually there was remarkably little blood-loss, but occasionally there was very extensive retroperitoneal hæmorrhage spreading up into the kidney region. In most cases the rupture was not diagnosed until the necropsy.

Summarising this dystocia group, three facts stand out: (1) the abnormally large baby is primarily responsible for 85% of the deaths in the whole group; (2) excluding rupture of the uterus, there was not a single shock death in all the patients delivered per vaginam in the first day or two, however forcible the delivery; and (3) the frequency of rupture of the uterus in multiparæ.

Third Stage.—This series does not include patients who died purely from overwhelming postpartum hæmorrhage. The retained-placenta group consists entirely of patients in whom the placenta had been left in utero for 2–8 hours. Shock was often severe before the placenta was delivered, and several patients died with the placenta still in utero. Hæmorrhage varied in amount and was usually slight. Labour had often been short, and parity was not significant. There was not a single death due to removal of the placenta in the first hour or so, however vigorous the manner of removal. Pathologically there is usually slight bruising of the peritoneum near the umbilicus, apparently due to attempts to express the placenta. In five cases there was definite accretion.

There were only two deaths due to inversion of the uterus, and in both cases the inversion occurred spontaneously after a perfectly simple third stage. There was very little hæmorrhage, but the shock was extremely severe and death occurred quite quickly before replacement could be attempted.

There were no deaths in the whole series that could be ascribed to "pituitrin shock."

"*Toxæmia.*"—Accidental hæmorrhage includes only the concealed and mixed varieties satisfying the three criteria of abdominal pain with a hard tender uterus, retroplacental clot, and a stillborn baby. Table IV shows that with advanced multiparity the condition becomes more common and the death-rate from shock increases rapidly. Such patients near term tend to die undelivered; whereas, if the condition occurs at 28–35 weeks, they usually deliver the fœtus before they die. Pathologically there is the well-known uteroplacental apoplexy. The hæmorrhages may occur also in the parametria and sometimes in the tubes or ovaries. The total blood-loss may sometimes be considerable, even 2 litres. Not infrequently there are multiple splits on the peritoneal surface. The kidneys nearly always show histological lesions.

The hypertensive toxæmia group forms the nearest approach to idiopathic shock. These few patients had some hypertension during pregnancy and, after normal labour and delivery, went into unexplained fatal shock. Pathologically they showed the renal changes of the toxæmia, but this does not appear to account adequately for the shock.

Other Conditions.—The cæsarean-section group is equally puzzling. These patients had uncomplicated section for various conditions and some hours later became severely shocked and died. At necropsy the operation wound and the rest of the uterus did not show any abnormality.

The small group of complicating diseases consists of shock deaths in which some unexpected condition, such as pneumonia, is found at necropsy.

Comment.—Taking all these 147 patients together, in nearly half of them the shock may be accepted as unavoidable in the present state of our knowledge. Two groups, however, require consideration: the prolonged labours and the retained placentas.

On general principles it may appear eminently reasonable to expect that an extremely forcible delivery during the first day or so of labour should lead to severe shock. The available data do not, however, support this view. There were such forcible early deliveries during the period under review, but the exact number is unknown. The important fact is that there were no deaths among them due to shock of the type that develops after prolonged labour (cases of rupture of the uterus being excluded). In contrast, there were 46 deaths from shock in patients left for 3, 4, or more days in labour and then delivered with usually relatively little further trauma. The two factors, length of labour and trauma of delivery, both probably play their part in leading to shock, but the importance of length of labour does not appear to be sufficiently recognised.

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Special attention must also be directed to the menace of the placenta left too long in utero. The view is commonly put forward that Crédé's expression is such an obviously brutal maltreatment of the uterus that it is bound to produce a high incidence of shock. The fact is that, no matter what the method of removal of the placenta (spontaneous delivery, Crédé, expression by pure physical force, or manual removal), there was not a single shock death in the present series when the placenta was removed in the first hour. But 35 women died of shock when the placenta was left in utero 2 hours or more. Some of these patients had presumably undergone unsuccessful attempts to express the placenta, and it is impossible now to assess how vigorous these attempts were; the other patients were delivered in wards where there were strict rules against handling the uterus in the third stage. It seems that more emphasis should be placed on the danger of the the long third stage of labour than on the precise technique of removing the placenta.

SUMMARY

The clinical study and post-mortem examination of 147 fatal cases of shock in relation to labour lead to the following conclusions.

Most of the manifestations of shock are due to a vasoconstrictor mechanism which reduces the blood-flow to skin, muscles, and abdominal viscera, though not interfering with the blood-flow through the brain. The slowing of the blood-flow through most of the body leads to a reduction of the return of blood to the right heart. This interferes seriously with cardiac function, leading to a low pulse-pressure and later to a low arterial blood-pressure. Characteristic subendocardial hæmorrhages occur in the heart, and the patients die finally from what appears to be a failure to maintain even sufficient cardiac output to supply the brain.

In shock there occur other changes indicating an overactivity of the sympathetic relative to the parasympathetic. These include in many cases dilatation of the stomach and proximal colon. There is no evidence that any primary endocrine disturbance is involved in the production of shock.

The vasoconstrictor changes in shock are similar to the defence mechanism which occurs in response to hæmorrhage. In shock, however, the mechanism appears to come into action without purpose, and its results are harmful. It is probably evoked by nervous or biochemical factors and not by any significant reduction of blood-volume.

Controlled investigations of the effects of blood-transfusion in shock indicate that this treatment is not of any value in saving the lives of the patients.

The commoner obstetric causes of shock are prolonged labour, ruptured uterus, retained placenta, and accidental hæmorrhage. Particular emphasis is placed on the danger of the labour which has lasted over 2 days and of the third stage which has lasted over 2 hours.

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THE INITIATION OF CELLULAR INFECTION BY INFLUENZA AND RELATED VIRUSES*

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DURING the last two years at the Walter and Eliza Hall Institute we have been engaged on an explicitly formulated task—to determine the nature and significance of the phenomenon of red-cell agglutination by influenza and related viruses.

Recently we have been able to bring several aspects of the work together in a provisionally satisfactory fashion to form a solid stepping-off point for further work. We have found that the influenza viruses contain as an integral part of their surface structure an enzyme which is adsorbed by and eventually destroys certain specific molecular groupings of a mucin which forms part of the cell surface. Unless this process can occur, infection of the cell cannot take place. We have obtained and partially purified a soluble enzyme which, by destroying the specific adsorptive power of the mucin in the cell surface, prevents adsorption of the virus and infection.

These findings appear to open up a number of possibilities of high potential importance, notably a logical approach to virus chemotherapy.

VIRUS HÆMAGGLUTINATION

Very soon after it had been found that influenza viruses could multiply in the allantoic sac of chick embryos and produce fluids containing large amounts of virus, Hirst (1941) observed that such fluids agglutinated red cells. It was immaterial whether chicken, human, or guineapig cells were used. With a typical active allantoic fluid any of these cells would be agglutinated up to a dilution of a few hundreds.

Detailed investigation of the phenomenon soon made it clear that the agglutination was a function of the virus particles themselves. If an active virus preparation is treated with an excess of red cells in the cold, almost all its infective power is carried down with the cells on centrifugation. Agglutination is essentially similar to agglutination by an immune serum. Instead of the bridges made by union of single antibody molecules with antigen on two different cells, we have virus particles functioning in similar fashion binding the red cells into rapidly settling aggregates. With suitable quantitative methods it is easy to adapt hæmagglutination to the titration of virus and antibody, and most of the detailed present-day work on the epidemiology of influenza, on the preparation of vaccines, and on tests of their effectiveness, makes use of such methods.

The first evidence that viruses other than those of the influenza group would agglutinate red cells was obtained with Newcastle disease of fowls (Burnet 1942) and shortly afterwards with fowl plague (Lush 1943). Then in 1945 Levens and Enders found that mumps virus was also active. All these viruses can be shown to cause agglutination in essentially similar fashion. The virus particles themselves act as the agglutinating agent and the same type of receptor on the red cells is involved. The finding from our laboratory that vaccinia and mouse-pox (ectromelia) viruses also agglutinate certain red cells is not directly related to the question; in these reactions a soluble substance, not the virus, is concerned.

The first indications of the real nature of the hæmagglutination reaction with influenza virus were obtained by Hirst in two fundamental investigations. In the

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first (Hirst 1942) he showed that red cells to which virus was adsorbed in the cold could be freed of the virus by holding for a few hours at 37°C. With the elution of the virus the cells became stable in suspension and were not agglutinated by fresh virus. The eluted virus retained its full infective and hæmagglutinating power and could be used successively to treat repeated quantities of red cells. Hirst recognised that this capacity of the virus to destroy a virtually unlimited amount of red-cell "receptor" was characteristic of an *enzyme reaction*.

In a second paper, Hirst (1943) showed that essentially similar reactions took place in the excised ferret lung. In a suitable set-up, virus run in through the trachea was rapidly adsorbed and held by the lung for 2–5 hours before elution occurred with almost complete reliberation of the virus. Hirst deduced from this phenomenon that the susceptible cells of the respiratory tract reacted similarly to red cells, and that the essential first stage in the process of infection was adsorption to and enzymic destruction of some specific component of the cell surface. The fundamental problem then was to identify this vital comonpent of the cell surface.

THE RECEPTOR GRADIENT

Our approach to this problem has been a very indirect one. The knowledge and facilities were not available to allow of any attempt at chemical isolation and characterisation of the red-cell component concerned. The work has progressed essentially at a biological level throughout.

The first step was an observation made in 1943 that red cells which had been treated with Newcastle disease virus (N.D.V.) rapidly became inagglutinable by that virus, but retained their full agglutinability by the influenza viruses. This suggested that perhaps each virus had its own particular point of attack on the red cell. A cell resistant to influenza-virus agglutination might be susceptible to N.D.V. and mumps and so on. At that time Hirst's (1943) paper was not available and cells agglutinated by influenza virus were stabilised by treatment with small amounts of immune serum and washed. On testing these cells they were found to be still agglutinable by the influenza viruses but not by N.D.V.

At intervals during the next 2 or 3 years this phenomenon was analysed and the idea of a receptor gradient formulated (Burnet et al. 1946). The viruses of the group which agglutinate red cells by the direct action of the virus particles can be arranged in a linear series in such a way that red cells rendered inagglutinable by any given virus in the series are also inagglutinable by any virus which precedes it but may be agglutinated by some or all of the viruses which follow it. The series is as follows: mumps, N.D.V., influenza A (Melbourne), A (WS), B (LEE), A (BEL), fowl plague, influenza swine 15, influenza B (MIL). Each individual strain has its own place in the gradient and the list given could be extended indefinitely.

We often had difficulty in obtaining cells from which all the virus had eluted. Most of it came off, but sufficient remained to render the cells unstable and so unsuitable for test against other viruses. The answer to this was to stabilise with dilute immune serum. This was usually effective, but the results were irregular. Sometimes the serum seemed actually to make the cells more unstable.

In working out the reason for this irregularity, we soon found that cells which had been acted on and stabilised by an influenza virus had become agglutinable by any serum, normal or immune, to a moderate titre of say 1 : 160. For an immune serum to be successful in stabilising partially treated cells it had to contain sufficient antibody for it to be effective at dilutions beyond 1 : 160. This appearance of a new type of agglutinability in treated cells had never been described in the literature on viruses, so the next step was to investigate its nature.

THE THOMSEN FRIEDENRICH PHENOMENON

It is well known to hæmatologists that occasionally casual bacterial contaminants will multiply in a suspension of human red cells and change their character, so that they are agglutinated not only by the iso-agglutinin serum appropriate to their ABO group but also by any other serum. This phenomenon was first described by Thomsen in 1926, and his collaborator, Friedenrich (1928), subsequently showed that the effect was due to a bacterial enzyme which was produced by two types of bacteria—diphtheroids and vibrios. Friedenrich's description of the way these bacterial enzymes acted indicated a close similarity to the Hirst phenomenon. Like the influenza virus, the enzyme could be adsorbed on the cells in the cold, and was eluted on warming. It could be used to change the character of successive lots of red cells just as the influenza virus could, without apparent loss of the active agent.

The next step was obviously to obtain such bacterial enzymes and see whether they acted similarly on red cells in removing virus receptors. Even before this we had been systematically testing various enzymes to see whether the virus receptors could be removed from red cells, and McCrea (1947) had found that *Cl. welchii* (*perfringens*) toxins had the capacity to do so. These toxins were quite highly active, but they were difficult to work with owing to the associated hæmolytic and other enzymes. For a time it seemed highly probable that the enzyme which destroyed the red-cell virus receptors was identical with the well-known lecithinase of *Cl. welchii*. This was one of the factors leading to our choice of *V. cholerœ* for the production of Friedenrich's enzyme since it has been stated (Felsenfeld 1944) that the vibrio produces a lecithinase.

We therefore obtained a culture of Friedenrich's diphtheroid and several cultures of *V. cholerœ*. Experiments with culture filtrates of both types showed at once that enzymes removing the cell receptors were produced, but the activity of the cholera cultures was much higher than of the diphtheroid filtrates. Almost all our subsequent work in this field has been done with filtrates from a strain of *V. cholerœ*.

THE RECEPTOR-DESTROYING ENZYME (RDE)

The conditions for maximal production of the enzyme were studied as soon as a convenient method for its titration had been elaborated. The technique was reduced to the simplest possible form and is carried out as follows:

Serial dilutions of filtrate or other material to be titrated for the enzyme are made in buffered saline containing 0·1% $CaCl_2$. An equal volume of 1% fowl cells is added and the tubes kept in a water bath at 37°C for 30 minutes. Next, to each tube one drop of a suitably diluted influenza virus suspension (Melbourne A. strain) is added, the tubes are shaken and are allowed to remain a further 20 minutes in the water bath before being read. In each series of tests a standard enzyme preparation is included.

Table I shows a typical protocol comparing a filtrate from a three-day broth culture with a so-called agar filtrate (see below) and a standard eluate.

The most satisfactory method of producing the enzyme was found to be by growth on plates of 1% nutrient agar. After 16 hours' growth the agar was scraped out of the plates into a gauze bag and the fluid pressed out through a Buchner funnel. The fluid was centrifuged and filtered through a Seitz disc. Such filtrates have very regularly a titre of 1600 to 2400 by the titration method described.

The enzyme was found to be non-dialysable, precipitated with half-saturated ammonium sulphate and other protein precipitants, and inactivated at a temperature which, according to the conditions of the medium, varied between 50° and 60°C. It was antigenic, producing

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TABLE I—TITRATION OF RDE

—	Enzyme dilutions							Control	Titre
	100	200	400	800	1600	3200	6400		
3-day broth filtrate ..	−	−	+	++	++	++	++	++	400
16-hour agar filtrate ..	−	−	−	−	±	±±	++	..	2400
Standard eluate	−	−	−	−	−	+	++	..	3200

with appropriate immunisation an antiserum which specifically inhibited its action on red cells and on the other substrates to be described later. In these respects, as well as in the kinetics of its activity, the agent behaved as a typical enzyme and we have referred to it as the receptor-destroying enzyme, RDE.

BIOLOGICAL ACTIVITIES OF RDE

The action of RDE on the red cell parallels in all essential respects the action of the influenza viruses (Stone 1947a). The susceptibility to agglutination by the different viruses is lost in practically the order of the receptor gradient, mumps virus forming the exception by coming two or three places later than in the original series. The development of Thomsen's so-called pan-agglutinability appears early in the action of the enzyme. It can be shown that this change results in the development of a new antigen on the red-cell surface (Burnet and Anderson 1947). No change is produced in the ABO character of the human red cell, but a well-defined change in the reactivity of Rh-positive cells appears. Such cells are now "agglutinated by "blocking" Rh antibody as well as by complete antibody (Pickles 1946). An interesting feature which deserves further study is the fact that treated cells are lysed by fresh guineapig serum but not by heat-inactivated serum; this may be a complement effect.

Of much greater significance is the action of RDE on the cells susceptible to infection by the influenza virus. First we may take the mouse lung and its behaviour with influenza virus B, as worked out by Fazekas (1947). His technique is almost identical with that of Hirst.

The mouse is killed and the trachea and lungs carefully removed. A tracheal cannula is inserted and the preparation supported on liquid paraffin in a small vessel with a side-arm by which the pressure can be raised or lowered to deflate or inflate the lung. The general form of experiment consists in running in a measured volume of fluid containing virus or other reagent, leaving it in contact with the lung for the required period, and then recovering the fluid by forcing it back through the trachea with a raised external pressure. The fluid is then analysed for virus content or other characteristic by the appropriate method.

The accompanying figure shows the general character of the results obtained with influenza virus B. In the normal lung the virus is completely adsorbed within 5 minutes and at room temperature (20°C) is reliberated 2 to 3 hours later, about 75% of the virus being recovered. If the respiratory tract is first washed out with RDE there is a complete and immediate loss of all power to adsorb the virus. If RDE is added to a lung on which virus is adsorbed, the virus is released within a few minutes. If it is added when elution by the normal process is complete, the remaining 25% of virus is forthwith released. The results are reproducible from mouse to mouse and allow of a variety of experimental studies. Work on the process of regeneration of receptors is at present under way.

The other convenient laboratory method of studying the cells susceptible to influenza virus infection is by the use of the allantoic cavity of the chick embryo. Stone (1947b) has just completed a very comprehensive study of the effect of RDE on virus adsorption, elution, and infection in this situation. Briefly her results can be summarised as showing:

(1) that in living embryos virus is adsorbed but not eluted;

(2) that in embryos killed by washing out the allantoic cavity with formalin, adsorption and elution occur as with red cells or with the mouse lung;

(3) that the addition of RDE prevents adsorption of virus;

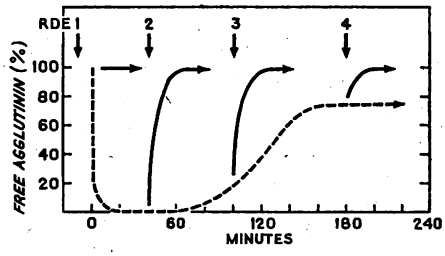
(4) that, by suitable treatment of the cavity with RDE, infection with any influenza virus or with N.D.V. or mumps can be prevented; and

(5) that after removal of RDE there is a recovery of susceptibility (regeneration of receptors) in 24–48 hours.

This summary is not only a record of a very detailed, extensive, and tedious investigation involving the individual handling of many hundred chick embryos, but it is also of high significance in establishing for the first time that virus infection can be prevented by the enzymic destruction of a cell constituent. The potential significance for the development of a method of active therapy of virus infection hardly needs pointing out.

THE FRANCIS INHIBITOR

So far the study of RDE has not been directly concerned with the nature of its substrate, and as long as the only available source of the substrate was in the surface of cells, it did not seem likely that any investigation on this point with our available facilities would be practicable. Early this year, however, Francis (1947) published an account of the high inhibitory power of serum against hæmagglutination by heated influenza B(LEE) virus. The titres obtained were much higher than those obtained against unheated virus.



Action of RDE on adsorption and elution of virus in the excised mouse lung. Ordinates represent the amount of virus obtained from the system by summation of the amounts obtained in successive washings expressed as a percentage of the amount originally added. Dotted line shows the behaviour of untreated lungs. Solid lines show the result of washing out the lungs with RDE at the points indicated by vertical arrows.

Since we had previously been interested in the non-specific inhibitory titre of normal sera (Burnet and McCrea 1946), experiments were made to confirm Francis's report. The effect seemed to be quite non-specific, a high titre being obtained irrespective of the animal from which the serum was derived. This suggested that the effect might be related to the agglutinin in most sera which acts on cells treated with RDE. An experiment was carried out to absorb the inhibitor for hæmagglutination by heated LEE virus (this will be referred to as Francis inhibitor or F.I.) from a normal serum. Freshly prepared treated cells were used and it was found that a great reduction in Francis inhibitor followed absorption. This result was unexpected, because the sera of very young children contain no agglutinin for treated cells but the normal amount of Francis inhibitor. Anderson took up the study to investigate this anomaly and failed completely to confirm the original observation. The difference was found to lie in the fact that effective cell suspensions contained considerable amounts of residual RDE. When this was removed by washing, after adequate time for elution of the enzyme, they were ineffective.

In this way it was found that Francis inhibitor in serum was rapidly destroyed by RDE. This finding was of much importance, since it provided for the first time a non-cellular alternative source of substrate for the

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enzyme. McCrea and Anderson (unpublished) have studied the distribution and chemical qualities of the Francis inhibitor in biological material. They found it present in extracts of perfused organs as well as in serum. It was precipitated with the globulins, but was relatively heat-stable, surviving boiling for 5 minutes. It was destroyed by trypsin and by the action of dilute potassium periodate. The latter reagent was used because of a statement in the 1945 report of the Rockefeller Foundation International Health Board that it

TABLE II—ENZYMIC ACTION OF INFLUENZA VIRUS B ON PSEUDOMUCIN

Virus agglutinating doses ..	240	120	60	30	15	7·5	Nil
Inhibitory titre: heated LEE B	< 10	< 10	<10	10	160	500	1000

Mixtures held at 37°C for 4 hours.

destroyed virus receptors in red cells. The use of periodate as an active oxidising agent for carbohydrates suggested that an agent susceptible both to trypsin and to periodate might be a polysaccharide protein complex—perhaps a mucin.

THE VIBRIO MUCINASE

Our interest in glandular mucins had been provoked during a study of *V. choleræ* filtrates for other enzymic activities which might be equated with RDE action. In searching for a collagenase, segments of guineapig intestine were used and the filtrate showed a high desquamating activity apparently due to an enzyme. It was soon shown that the desquamating enzyme was not RDE, but in view of the pathological process in human cholera the phenomenon was investigated further. An account has been published of this work (Burnet and Stone 1947), and it need only be said that the effect was eventually shown to be due to the action of a mucinase acting on intestinal mucin.

Since there is very little work reported on enzymes active against glandular mucin, in contrast to the very extensive recent literature on tissue mucin (hyaluronic acid) and hyaluronidases, this active enzyme has been under investigation for some time. In an effort to simplify the technical procedures necessary in titrating the enzyme, a simple and satisfactory test for "intact" mucin has been developed.

The solution is simply coloured with Congo red, a dye insoluble in alcohol, and a drop deposited in a dish containing a shallow layer of acid alcohol (1% HCl in 70% alcohol). If an adequate concentration of mucin is present (of the order of 0·1%) the drop remains coherent, forming a round blob or a doughnut-shaped figure which subsequently contracts to a concentrated wisp of deeply stained coagulated mucin. Other proteins—e.g., serum—are coagulated but produce a granular, rapidly dispersing haze without any firm outline. The end-point of mucinase action is determined by the extent to which this power of producing a definitely outlined pattern in a test drop is destroyed.

The test, which we refer to as the ACRA test, has proved most satisfactory, allowing of much more rapid and extensive work than the conventional viscosimetric technique.

The only relevance of this work on mucinase to the present communication is that it provided a means of recognising true mucin and a stimulus to consider a possible relationship to the substrate of RDE. It was found, for instance, that potassium periodate had an actively destructive effect on mucin at high dilution and that with some samples of mucin trypsin was also actively destructive of the power of dilute glandular mucin to give a characteristic pattern in acid alcohol.

MUCIN AS FRANCIS INHIBITOR

As soon as the experiment was tried it was evident that glandular mucin from human sources—fasting stomach contents, pseudomucinous ovarian cyst, and cervical (uterine) mucus—had high activity as Francis inhibitor against heated influenza B virus and that this activity was rapidly destroyed by RDE. The same held for a sample of purified blood-group substance O prepared from a pseudomucinous ovarian cyst by Dr. W. T. J. Morgan at the Lister Institute (Morgan and Waddell 1945).

It will be recognised that an identification of the Francis inhibitor as mucin is in accord with all the characters of the inhibitor observed in preparations from serum, and further that it immediately implies that the receptor on the red cell and the susceptible respiratory cell is also a mucin. The fact that a known mucin—that which carries the A, B, or O blood-group specificity—is present on the human red cell makes the interpretation acceptable from every point of view. In all probability it is another aspect of this same mucin molecule that is responsible for the virus receptor, although further work may indicate that two or more different types of mucin molecules are concerned.

The evidence that the virus and enzyme substrate is a mucin and not some associated substance may be summarised as follows:

(1) Purified blood-group substance is active as a Francis inhibitor to a dilution of 1 : 500,000.

(2) Mucin can be "dialysed" through ordinary filter-paper against normal saline with free diffusion of soluble protein such as hæmoglobin and little loss of viscosity. The Francis inhibitor is retained.

(3) The destruction of Francis inhibitor by reagents specific for protein (pure trypsin) and carbohydrate (potassium periodate) speaks strongly for the inhibitor being a protein polysaccharide complex.

(4) A wide range of mucinous materials show the Francis inhibition effect.

FURTHER EVIDENCE THAT MUCIN IS THE PRIMARY SUBSTRATE OF ENZYME ACTION BY INFLUENZA VIRUSES

Most of the evidence which has been adduced for believing that a mucin is the substrate for virus action on the cell is derived from the reactions of RDE. A more direct though perhaps not more valid proof is to show that influenza viruses can themselves act on soluble mucin or purified blood-group substance. The demonstration of this effect is surprisingly easy. Suitable concentrations of mucin and of virus in the form of allantoic fluid are mixed and held at 37°C. At intervals samples are taken and heated to 65°C for 30 minutes to destroy the virus. They are then titrated for Francis inhibitor in the usual way. A progressive reduction in titre is found, the rate depending on the concentration of virus used. Table II shows a typical experiment using semipurified pseudomucin and influenza virus B. It is easy to show in other experiments that the virus is not appreciably diminished in amount or activity in the process.

Virus heated to 56°C has lost practically all its capacity to destroy soluble mucin, although it still agglutinates red cells to full titre. The basis of the inhibition described by Francis thus becomes obvious. The heated virus unites with soluble mucin but unlike active virus is unable to act enzymically on it. The active groups which could react with red cells are thereby blocked and the effect observed is the inhibition of its hæmagglutinating power.

The following experiment, in which two typical samples of human mucin were used, gives a fairly comprehensive picture of the action of the three agents, vibrio mucinase, vibrio RDE, and influenza virus B.

The mucin samples were:

(1) Cervical mucus from a normal woman (RIC). This was received as a small portion of very dense tenacious mucus which was emulsified without difficulty in buffered saline and further diluted to approximately 1 : 100 of the original material.

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(2) Highly viscous fasting gastric contents from an achlorhydric subject (GRI). This was used at a dilution of 1 : 10 in buffered saline.

The enzymes were:

Dried semipurified vibrio mucinase 1 : 500 solution with a mucinase titre of 3200 and RDE titre of <2.

Dried RDE 1 : 500 solution with RDE titre of 1600 and mucinase titre of 8.

Allantoic fluid virus LEE B dialysed against tap-water and used at a final dilution corresponding to 100 hæmagglutinating units.

Equal volumes of mucin and enzyme dilutions were mixed, held for 2 hours at 37°C, and then heated for 30 minutes at 65°C to inactivate the enzymes or virus. They were then titrated by the ACRA method for content of intact mucin, and for inhibitor against heated LEE virus. The uterine mucus was from a group-A secretor, and this was tested for its power to inhibit agglutination of group-A human cells by an appropriate serum. None of the specimens showed any change in this activity. Table III summarises the results.

These results show, first, the complete destruction of Francis inhibitor by RDE and its great reduction by dialysed virus; second, complete destruction of the cohesiveness of mucin by mucinase, a slight effect with the RDE preparation presumably due to its residual mucinase, and no effect whatever with the virus. The apparently protective or enhancing effect of the virus on the ACRA titre has been confirmed on several occasions with this particular sample of mucin. Finally, it will be seen that mucinase with no trace of RDE detectable by the standard test has a significant destructive effect on the F.I. activity of mucin.

TABLE III—ACTION OF ENZYMES ON HUMAN MUCIN (RIC UTERINE, GRI GASTRIC)

Enzyme	Mucin RIC		Mucin GRI	
	ACRA	F.I.	ACRA	F.I.
Control	5	1000	2	400
Mucinase	0	60	0	160
RDE	2	<2	1	<2
Virus LEE.. ..	6	40	2	2

All the points raised in this experiment are now being studied in detail.

WIDER SIGNIFICANCE OF VIRUS-MUCIN RELATIONSHIP

Looking at these results from the point of view of their general significance and possible future development, one of the first points to be considered is whether they provide an explanation of the cellular tropisms of viruses. If a mucin of the required character is not present in the exposed cell surface infection cannot take place. This is a very simple explanation and perhaps it should not be taken too seriously. The initiation of virus infection is all that we are concerned with in these experiments, and the very fact that virus does not multiply in the red cell should underline the limitations of our knowledge. It is probably correct to say that cells without the appropriate mucin in their surface structure are insusceptible to viruses of this group, but the converse that cells so provided *are* susceptible is incorrect. Once infection is initiated, other necessary conditions must be provided before multiplication of the virus can occur.

The question arises whether the necessity of an initiating enzyme action on a cell surface component (other than glandular mucin) is a prerequisite for the infection of appropriate cells by other viruses. I feel that this may well be the case and the idea may provide a useful working hypothesis for future research. It should be recognised that the picture in influenza could never have been visualised without the lead provided by the hæmagglutination reaction. This depends essentially on the fact that red cells possess in their surface structure the same type of mucin as is characteristic of the cells susceptible to influenza-virus infection. If it should happen that a neurotropic virus has an essentially similar enzyme action, perhaps on a different type of polysaccharide or a lipid, effective investigation might have to wait until some means of detecting the action by a technique comparable to hæmagglutination can be developed. Exploratory experiments with several viruses are being planned.

From the practical point of view, the greatest potential importance of this work is the fact that it opens up a possible approach to the chemotherapy of virus disease. We have shown that in experiments on animals destruction of the cell receptors by the vibrio enzyme renders infection of the cells impossible. If the particular aspect of the mucin molecule on which the virus enzyme acts can be chemically defined, real possibilities either of blocking the receptors or of inactivating the enzyme by an appropriate drug will arise. Incidentally, one wonders whether perhaps the film of mucus which covers the healthy respiratory membranes may not have an almost chemotherapeutic function in temporarily at least "mopping up" viruses of the influenza group in virtue of its chemical structure.

Finally, we must not forget the possible significance of the fact that the most virulent and effective bacterial pathogen of mucous surfaces—the cholera vibrio—produces in large amount at least two enzymes active against glandular mucin. This is hardly likely to be a fortuitous circumstance. It may be that pathogens of mucous surfaces frequently or regularly produce enzymes acting on mucin as an essential part of their offensive armament—just as the characteristic pathogens of connective tissue have their hyaluronidases. There is a big field for investigation here, the results of which may have important repercussions on clinical medicine.

SUMMARY

The hæmagglutinating action of the mumps-influenza group of viruses has been shown to be due to the presence of an enzyme as an integral part of the virus particle surface.

The substrate of the enzyme is a mucin present in the surface layer both of erythrocytes and of the cells susceptible to infection by influenza viruses.

By the use of an enzyme derived from *V. choleræ* and active against the same substrate, cells can be rendered insusceptible to infection by viruses of the group.

This paper is an account of a joint investigation in which the following members of the staff of the Walter and Eliza Hall Institute have participated: S. G. Anderson, F. M. Burnet, S. Fazekas de St. Groth, H. F. Holden, P. Lind, J. F. McCrea, and J. D. Stone.

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ANKYLOSING SPONDYLITIS

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MOST writers interested in ankylosing spondylitis think that its incidence is increasing. During the past year we have observed 32 cases in a 50-bed unit devoted to rheumatic affections. Only a small proportion of these had been accurately diagnosed before admission, though the recognition of ankylosing spondylitis, even in its early stages, is not difficult.

Briefly, ankylosing spondylitis is a chronic progressive arthritis of the spine in which there is an early radiological change in the sacro-iliac joints; this objective sacro-ileitis cannot be emphasised too strongly, because it is the key to early diagnosis. It is almost always present by the time that the patient seeks advice.

Incidence

Ankylosing spondylitis is much more common in males. Some authors mention a preponderance of 9 males to 1 female. We, however, cannot speak of sex-incidence, since our patients were perforce all males.

The commonest age of onset is the third decade. In our series 1 case started at 11 years of age, 6 cases at 15–20 years, 14 cases at 20–30 years, 9 cases at 30–40 years, 1 case at 40–50 years, and 1 case at 50–60 years.

Some writers have spoken of its frequency in a virile athletic type, causing speculation on the possibility of an endocrine factor in its causation, a "hypervirilism." Our cases have been associated with very different types of physique, and we attach no importance to build or temperament.

Ætiology

The cause is unknown. From the behaviour of the disease it is almost certain that infection of some sort plays an important part. Focal sepsis, including latent tuberculous foci, has been mentioned. But there are cases (8 of our series) where an exhaustive search for infection proves fruitless.

In 10 of our cases the tonsils were considered unhealthy; 8 had bronchial infection (perhaps in some of these the infection was secondary to diminished chest expansion, so common in spondylitis, rather than causal); the onset in 1 case coincided with a severe bronchitis, which remained chronic; 5 had tooth infection; and 3 had sinus infection. In most cases prostatic smears were examined, with negative results.

The possible association of ankylosing spondylitis and tuberculosis has been commented on by others. In our series 2 patients had a family history of pulmonary tuberculosis; 4 had a personal history of pleurisy; 2 had radiological signs of past tuberculous lung disease; in 1 severe case in a man of 22, whose radiograms on admission showed signs of extensive old lesions, pulmonary tuberculosis became active, with positive sputum, while he was under our care; and 1 patient had a history of tuberculous peritonitis.

We had made it a rule to search for focal sepsis and to eradicate it when possible, but it is notoriously difficult to assess the value of removal of septic foci in chronic rheumatic conditions.

None of our patients gave a history of gonorrhœa, and gonococcal complement-fixation tests were negative.

CLINICAL PICTURE

Pain

The earliest symptom is pain. In our series 12 patients first complained of low backache. Often the patient points accurately to the sacro-iliac region. Recurrent or persistent lumbago in a young male is a dangerous diagnosis and should demand radiography of the sacro-iliac joints and estimation of the erythrocyte-sedimentation rate (E.S.R.).

Pain often radiates from the back to one or both buttocks or thighs; this combination of backache and thigh pain strongly suggests early ankylosing spondylitis.

The original pain may be entirely in a thigh or a hip, on one or both sides, even before backache appears (9 of our cases). Only 1 patient spoke of pain radiating the whole length of the leg into the foot. In 1 case the initial complaint was of pains in the knees.

Pain may first arise in the shoulder and neck; 5 patients first complained of this region. Though radiation of backache into the thighs is common, not one of our patients mentioned radiation from the shoulder girdle into the arms.

Girdle pain is common and important, and can be of great diagnostic assistance. It was present in 10 of our cases. In 2 cases it was the initial complaint. It may develop in any region of the trunk and may be described as a pain or a tight-laced sensation. It is easy to understand that patients with girdle pain are not infrequently diagnosed, in the early stages, as cases of intercostal neuralgia, chronic pleurisy, or intra-abdominal disease. Girdle pain too brings to mind tabes dorsalis. One patient had hyperalgesia in his zone of pain.

Wherever the onset of pain, the patient usually soon complains of a low backache.

The pain may have one almost pathognomonic feature—it tends to be worse at night. Consequently the patient may lose much sleep, and a common story told is that he often rises and walks about to gain relief. This exacerbation was much complained of in 16 of our cases and we consider it of great diagnostic assistance.

There may be a variable amount of pain during the day. Some speak of constant aching; others of improvement or worsening with movement. In 2 cases the pain was worse with coughing and sneezing, a symptom which, with low backache, might well suggest prolapsed intervertebral disc. One patient spoke of exacerbation of pain with jolting; 2 could not bear to be slapped on the back.

Stiffness

This is the other great presenting symptom, but it is usually subsidiary to the pain and in some cases has passed unnoted by the patient. In the early stages we have had only 1 patient who spoke of stiffness without

Fig. 1—Ankylosing spondylitis showing characteristic blurring and loss of outline of sacro-iliac joints.

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pain. On waking, the stiffness may be so incapacitating that a common complaint is of difficulty in getting out of bed, improving with movement.

This, then, is the usual onset: an insidious development of backache, often in the lumbar region, perhaps radiating to the hips and thighs; or pain in the shoulder-girdle region; stiffness of some part of the spine, and often girdle pain.

A rarer onset is with prolonged fever and joint pains, strongly suggesting rheumatic fever. This is more common in younger persons (2 of our cases). Such an onset is difficult to diagnose, but the brunt of arthritis falling on proximal joints, the severity of backache, and radiological signs in the sacro-iliac region should facilitate its recognition.

Other Findings

Loss of weight is common, sometimes considerable, and most patients are under weight; however, 3 of our patients were over weight.

Microcytic anæmia is common, even in the early stages; Hb 70–80% was a usual finding; 1 patient had Hb 50%. Anæmia may help an early diagnosis.

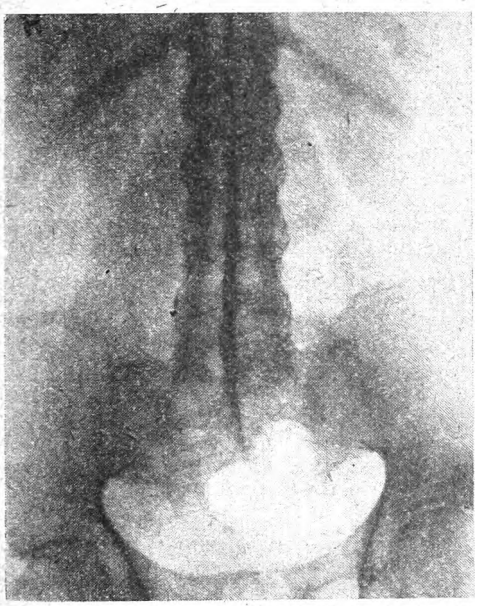

Fig. 2—Typical "bamboo spine" (hip-joints also involved).

There may be a rise in level of alkaline phosphatase in the blood. This was estimated in some of our cases, but no significant changes were found.

In the more severe and acute cases there may be long periods of low-grade pyrexia.

Tachycardia is common. Often there is loss of appetite. Indeed, the clinical picture of a severe case is that of general toxæmia and strongly suggests some active infection.

Iritis had developed in 2 cases—a lesser incidence than has been noted by others. In 1 case the history of iritis directed attention to the true cause of the backache.

Examination in the Early Stages.—There may be practically no clinical findings. We have had 2 cases where the spinal movements were normal. As a rule, however, there will be some limitation of spinal movement, perhaps most notable in bending forward. Not all normal spines in young people are equally flexible in bending forward, but the lateral movements are free. This is not so in spondylitics, where the spinal movements are generally limited. In this early stage the diagnosis is made absolute by radiography of the sacro-iliac joints, which show blurring and gradual obliteration of outline, perhaps at first unilateral but quickly becoming bilateral (see fig. 1). These joints are difficult to assess radiologically, and we only outline here the radiological findings. Even in the patients who first complain of shoulder and neck pain, with little or no backache, the sacro-iliac joints are usually radiologically affected.

Fig. 3—Ankylosing spondylitis showing both sacro-iliac and hip-joints involved in a patient aged 22.

Chest Expansion.—As the condition develops, the costovertebral joints fuse and chest expansion is gradually diminished, even to ½ in. This loss of chest mobility renders the patient more liable to infection of the respiratory tract, and its finding may assist diagnosis.

Erythrocyte-sedimentation Rate.—In these early cases the E.S.R. is usually raised—a fact of much diagnostic value which should detract from such facile diagnoses as fibrositis, intercostal neuralgia, lumbago, and neurosis. Nevertheless in one of our cases where we were confident of our diagnosis on clinical grounds the E.S.R. was not raised, and sacro-iliac radiograms were within normal limits, but some calcification showed in the iliolumbar ligaments.

COURSE AND PROGNOSIS

As the untreated disease advances, the diagnosis can often be made at a glance. Ankylosing spondylitis is characterised by thoracic kyphosis, poking forward of the head, and flexion and rigidity of the cervical spine, with the result that the patient may be unable to look forwards or sideways—in fact a condition of spinal immobility so aptly termed "poker back." One of our patients had on admission such acute neck flexion that he found difficulty in feeding. It is in this stage that the characteristic "bamboo spine," due to calcification of the spinal ligaments, is seen radiologically (fig. 2).

Ankylosing spondylitis is a chronic disease undergoing remarkable remissions, intermissions, and exacerbations. Some cases run a rapid course to complete ankylosis. Thus, one of our patients, aged 53, who had a complete "bamboo spine," insisted that he had been completely supple and well six months before. In other patients the disease may remain localised to the sacro-iliac region for years, and probably in some cases the disease is arrested in this stage. A gradual spread throughout the whole spine is the rule.

In most cases the disease is confined to the spinal articulations. Any tendency to spread is to the most adjacent joints—i.e., shoulders and hips—and it is rare for more distal joints to be affected in the ankylosing

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process. As regards the hip-joints this is a most unfortunate complication, because they tend to fuse completely (fig. 3). In our series 5 patients had shoulder and 5 patients had hip affections objectively. As we have already remarked, a small proportion of cases may appear to start in one or both shoulders or hip-joints and then spread to the spine. Nevertheless in these cases the radiological condition of the sacro-iliac joints will be pathognomonic. In 3 of our cases the knees were so extremely painful that movement could scarcely be attempted; yet radiologically the knees were normal.

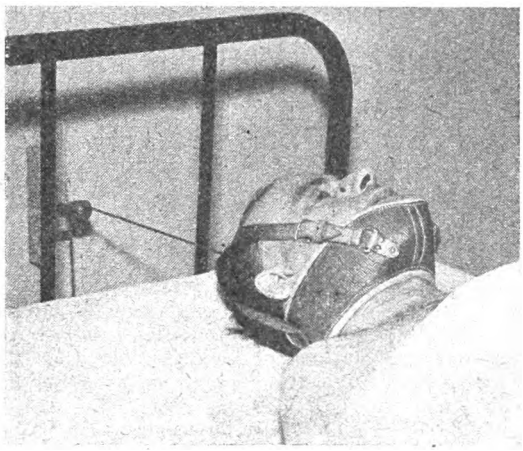

Fig. 4—Sayre's sling; a weight of 7 lb. or more is attached to cord.

RELATION TO RHEUMATOID ARTHRITIS

Some teach that ankylosing spondylitis is a disease sui generis, distinct from rheumatoid arthritis, and that the peripheral joints are never affected. We are not of this opinion; 2 of our patients who had typical ankylosing spondylitis later developed rheumatoid changes in the wrists, fingers, ankles, and feet. Again, we have many cases of long-standing and destructive rheumatoid arthritis with typical "bamboo spines" and sacro-iliac destruction. We believe that ankylosing spondylitis and rheumatoid arthritis are one and the same disease, and that the difference consists only in the pattern and order of joints affected. Rheumatoid arthritis gives essentially a centripetal distribution, and it is surprising how often the hips and spine are spared, even in severe cases. For some unknown reason ankylosing spondylitis has a centrifugal origin and order of spread.

It has appeared to us that the hip-joints, if affected in ankylosing spondylitis, are peculiarly painful, scarcely tolerating the slightest attempt at movement.

DIFFERENTIAL DIAGNOSIS

Confusion may arise with the following conditions:

(1) The commonest error by far is to make the always unsatisfactory diagnosis of fibrositis, lumbago, or neuritis.

(2) In early stages, especially with remissions, a diagnosis of malingering or "neurosis" was not unusual in our series.

(3) Sacro-iliac strain or subluxation, once a popular diagnosis, has now become unfashionable. Radiology and E.S.R. assist in its exclusion.

(4) The backache, with general deterioration in health, which is so common, with perhaps some obscure pyrexia, may easily suggest Pott's disease. Indeed, one of our cases was so diagnosed and treated for several months. Tuberculous sacro-ileitis can be confused but is almost invariably unilateral and its symptoms non-remittent.

(5) Adolescent kyphosis.

(6) Osteo-arthritis of the spine can give rise to very similar symptoms, but the radiograms clinch the diagnosis.

(7) The girdle sensations may suggest tabes dorsalis, syphilitic pachymeningitis, or intra-abdominal and intra-thoracic conditions.

(8) The rigidity of an advanced case may, at a glance, suggest paralysis agitans.

(9) Other causes of chronic backache (prolapsed disc, neoplasms, osteomyelitis, spondylolisthesis, &c.) should cause little difficulty.

PROGNOSIS

Ankylosing spondylitis is a chronic disease which may undergo remissions and exacerbations over years, tending ultimately to ankylosis of the whole spine. Some cases run a very acute course to quick fusion of the spine, and others progress slowly and relentlessly over many years. It is probable that spontaneous arrest may take place at any stage, and we have seen cases, virtually untreated, with little kyphosis, which have apparently been at a standstill for many years. The reduced chest expansion renders the patient more liable to infection of the respiratory tract. Modern opinion holds that the disease can be arrested by X-ray therapy, and the prognosis is improved by efficient treatment. In our series the most acute and severe cases were in the youngest age-groups.

TREATMENT

As in all chronic diseases undergoing natural remissions, it is not easy to assess lines of treatment. Nevertheless there are some well-defined therapeutic measures. In the active stages the patient should be rested in the best possible surroundings with a maximum of sunshine, fresh air, and good nourishment. We have used additionally high dosage of vitamins A, C, and D and fresh yeast. Iron is often required. Indeed, a régime such as is used at sanatoria for tuberculosis appears the ideal, and on general lines the treatment should approximate to this as much as possible. We have given generalised ultraviolet rays to all our cases.

The patient should rest on a non-sag mattress. This, we feel, is so important that we have used fracture boards under a thin mattress. One should aim at a gradual reduction of pillows until ultimately the patient can lie flat in the bed with the occiput resting on the mattress.

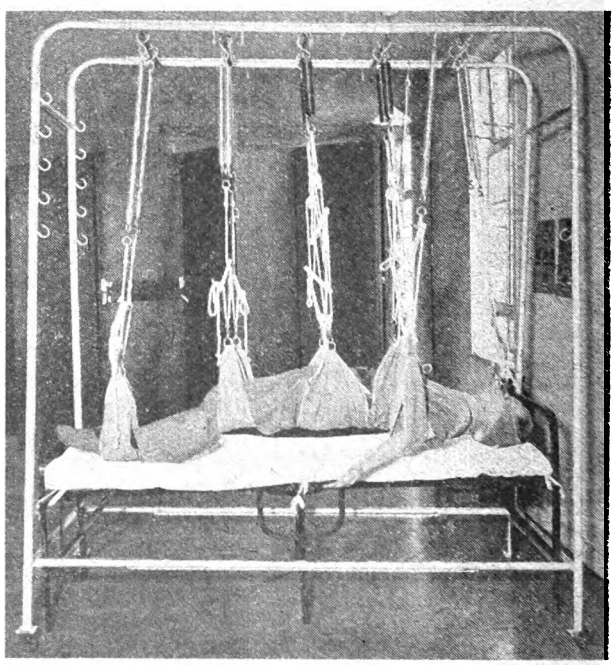

Fig. 5—Guthrie-Smith's method of slinging.

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A long and very narrow pillow running the length of the dorsal spine may help the rounded shoulder to fall back. Thereafter the patient should always sleep without a pillow or, where this is impossible, with the smallest pillow which will rest the head, and the patient should learn to sleep on the back; sandbags alongside the patient will help to maintain his position. These simple measures are most important in overcoming and preventing the dorsal kyphosis that is so common, and it is surprising how many patients, after a few days' complete rest on a pillowless bed, lose an appreciable amount of kyphosis. The improvement in the back deformity is usually obvious to the patient, who may mention that he is inches taller, and his coöperation in treatment is at once assured. This good effect can be observed in cases where radiologically the various spinal ligaments show calcification, and is therefore mainly due to a relaxation of muscle spasm by gravity.

While there is deformity which can be improved, or a tendency to increasing deformity, the patient cannot rest supine too much. By measuring the distance between the occiput and the mattress when the patient is recumbent one can assess progress and need of bed rest essential for the optimal position of the spine.

With an intelligent assiduous patient this method of resting the spine will obviate the need of plaster shells. Rest in serial plaster shells is a well-recognised and important line of treatment. Breathing exercises should be taught to the patient as soon as the diagnosis is made, and the necessity of performing them regularly insisted on.

Because of the occasional spread to the hips and shoulders, one should be on guard to see that these joints retain their full range of mobility. In cases with limited movement of the neck a Sayre's sling, with traction by weight and pulley from the head of the bed (fig. 4), often adds astonishingly to the range of neck movement. The traction should be applied as often and for as long as the patient will tolerate it, while it is adding to his movements. Suspension of the body in Guthrie-Smith slings (fig. 5) is of definite value in improving and maintaining flexibility of the spine.

Deep X-ray therapy is said to be the most effective weapon in the treatment of ankylosing spondylitis, and there is a general consensus of opinion that by its expert use the disease can be arrested. The treatment is highly specialised and is the work of a skilled radiotherapist. The details will not be discussed here. All our cases, even in the advanced stages, have had this treatment. It is too early to decide on its efficacy in this series but several of our patients have had much relief of pain and stiffness. On the other hand, we have seen 3 cases which in the past had had X-ray therapy and were in an active advancing state. Perhaps in such cases the dosage has been insufficient.

During the course of X-ray therapy we do not give ultraviolet rays. The patient should be warned of the possibility of X-ray nausea and sickness.

On the recent suggestion of hypergonadism (in a wide sense) as a possible ætiological factor, we intend to try œstrogenic preparations. In 2 cases we have used hexœstrol, but, we feel, in insufficient dosage to have given it a fair trial.

Gold is said to be of little or of no service in ankylosing spondylitis; nevertheless, because of its undoubted good action in rheumatoid arthritis, we have in our more recent cases used chrysotherapy.

Ankylosed hips may require some type of arthroplasty.

Our thanks are due to Dr. C. B. Heald, senior rheumatologist, Royal Free Hospital, for permission to publish these cases. Acknowledgments are due to the *Nursing Mirror* for permission to reproduce figs. 4 and 5.

ACTION OF TETRAETHYL AMMONIUM BROMIDE

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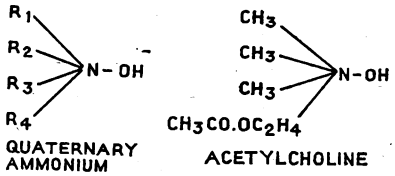
THE work of Lyons et al. (1947) and Coller et al. (1947) in America has suggested that the limb vasodilatation resulting from the intravenous injection of tetraethyl ammonium bromide serves as a reliable and accurate prognostic aid in the study of peripheral vascular disease. They claim that the rise in the skin temperature is equivalent to that obtained by either local nerve or paravertebral block. Since so reliable a response does not accord with the original experimental work of Burn and Dale (1915), the following study was undertaken. (The possible therapeutic value of tetraethyl ammonium bromide will not be discussed here.)

The quaternary ammonium compounds are, as their name implies, based on ammonium hydroxide in which alkyl groups are substituted for the four hydrogen atoms directly bound to the nitrogen atom. The physiological properties of the compounds in which the alkyl radicles are either methyl or ethyl have been investigated and tetraethyl ammonium bromide (or chloride), in particular, has been used clinically. The effects noted have been mainly those concerned with the activity of the autonomic nervous system, and in this connexion it is interesting to note the relationship between the quaternary ammonium compounds and acetylcholine:



QUATERNARY AMMONIUM — ACETYLCHOLINE

The curarine-like effect of the quaternary ammonium compounds was demonstrated by Marshall (1912, 1913), who produced a curariform paralysis in frogs by the administration of the various methyl and ethyl substitution compounds. He found that the tetramethyl compound was the most and the tetraethyl compound the least active. The activity decreased in order with the substitution of ethyl for methyl groups, though no mathematical relationship was observed. Taking the activity of tetramethyl as 100, the series showed diminishing activity: trimethylethyl 80; dimethyldiethyl 8; methyltriethyl 2; and tetraethyl 0·8.

Burn and Dale (1915) studied the effect of tetramethyl ammonium and tetraethyl ammonium compounds on cats. In the intact animal the results were variable; so the animals were completely pithed, the whole of the brain and spinal cord being destroyed, and consistent results were then obtained. Tetramethyl showed both muscarine and nicotine reactions. The peripheral reactions were abolished by the injection of atropine. With the completely pithed animal it was found that 1 mg. of tetramethyl ammonium injected intravenously caused the carotid blood-pressure to rise from 75 mm. to 240 mm. Hg in about 20 sec. In large doses a block effect was obtained: 50 mg. of tetramethyl ammonium injected intravenously abolished the pressor effect of 2 mg. of nicotine. The tetraethyl ammonium compounds did not show the stimulant action of the tetramethyl ammonium

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compounds, but the block effect, though reduced, was observed. When 50 mg. of tetraethyl ammonium was injected intravenously, the pressor effect of 5 mg. of tetramethyl ammonium was reduced to about half that of 0·5 mg. in the control animal.

Lyons et al. (1947) confirmed the lack of pressor and peripheral effects of tetraethyl ammonium in the spinal animal. In the intact animal 0·1–10 mg. per kg. of body-weight caused a fall of arterial pressure.

The inference to be drawn from the foregoing experiments is that the site of action is the preganglionic synapse or the ganglion cell. This was confirmed by Lyons et al. (1947) by producing a sustained retraction of the nictitating membrane of the cat by electrical stimulation. With preganglionic stimulation the effect was abolished by intravenous injection of tetraethyl ammonium. With postganglionic stimulation no change was observed.

TECHNIQUE

Establishing Basal Conditions.—The following technique has been routinely used in our investigation. The patient is stripped of clothes except a pair of trunks and rested horizontally on a bed in a draughtless room of temperature about 20°C. An interval of 20–30 min. is then allowed for the skin temperature and resistance to reach basal levels. Frequent readings ascertain when this has been achieved. Numerous blood-pressure and pulse-rate readings are meanwhile taken, to acquaint the patient with the pattern of investigation, and fear is allayed by reassurance that the procedure is painless and innocuous. This is necessary, for Coller et al. (1947) have pointed out that fear on the part of the patient, with its increase of adrenaline output, might conceivably nullify the action of tetraethyl ammonium bromide. Finally the blood-pressure, pulse-rate, size of pupils, skin temperature, and skin resistance are measured immediately before the injection. At least three observers are required, owing to the multiplicity of the readings and the speed with which they must be taken.

Dosage.—The maximal dosage used by us has been 500 mg. of intravenous tetraethyl ammonium bromide dissolved in a sterile 10% solution. This has been reduced to 400 mg. for patients weighing less than 8 st. A control series was given doses of 50–250 mg. and is discussed separately. Birchall et al. (1947), using the chloride salt to avoid the sedative action of the bromide, have described alarming and undesirable reactions with dosages of 31 mg. per kg. of body-weight in which a pronounced curariform effect was demonstrated by dysarthria ending in aphonia, dysphagia, intercostal-nerve paralysis leading to diaphragmatic breathing, and palsies of neck and throat muscles. One of their patients developed a complete circulatory collapse with cyanosis, loss of consciousness, vomiting, an imperceptible pulse, and blood-pressure. Artificial respiration, oxygen therapy, and "Prostigmin" were required to revive the patient. They also noted, among the 14 hypertensives tested, one severe asthmatic attack and three additional severe toxic reactions. Dogs have been killed with as little as 40 mg. per kg. body-weight (Lyons et al. 1947). The dosage of 4–7 mg. per kg. body-weight recommended by Birchall et al. (1947) is somewhat less than that used by us. Lyons et al. (1947) and Coller et al. (1947) have used 200–500 mg. of the bromide salt intravenously in many hundreds of cases without a death, though severe circulatory collapse was occasionally seen in the aged hypertensives with impaired renal function. Transient dysphagia, dysarthria, and a subjective sense of weakness were not uncommon. No toxic side-effects have been seen in our cases.

The Injection.—The subcutaneous and intramuscular routes are painful and have no advantage over intravenous injection. The drug is useless by mouth. The intravenous injection is given in the veins of the antecubital fossa over a period of 10–15 sec., and the patient is asked to describe the subjective phenomena which follow, and their nature and time of onset are noted. Any extravenous injection may lead to pain and flexor spasms. Blood-pressure, pulse-rate, pupil size, skin temperature, and skin resistance are measured every minute after the injection until the pre-injection basal levels are again reached.

Skin-temperature Measurement.—Skin temperature was measured with a thermocouple in a bridge circuit. An amplifier system was used to obtain the null point, which was read from a meter. The sharpness of the null point was such that a reading of better than 0·1°C was obtainable. Readings were taken from marked points on the digits and body, until the temperature had returned to the basal reading.

Skin-resistance Measurement.—Skin-resistance readings were taken between two electrodes spaced about 1 cm. apart on a great toe. A constant amplitude pulse lasting $^{1}/_{10000}$ sec. at a repetition-rate of fifty per sec. was fed to a potentiometer of which the patient's skin formed the lower limb. The amplitude of the pulse developed across the patient circuit depended on the skin resistance. The pulse was fed to a two-stage amplifier by a cathode follower circuit so that the amplifier input circuit should present an impedance much greater than the patient. The output of the amplifier was fed to a cathode-ray oscilloscope having a fifty-cycle sweep locked to the pulse generator. The amplified pulse was displayed against a centimetre scale on the face of the tube.

MATERIAL

We studied 50 patients, of whom 25 were "normal" without vascular disease or hypertension. The controls were selected from the ward during their incidental stay for herniorrhaphy, appendicectomy, &c. Their ages ranged from 19–60 years; 12 were female and 13 male. In 15 of the 50 cases there was obliterative vascular disease of the senile or juvenile type (see Boyd 1938), with or without hypertension. Their average age was 53, and all were male. The remaining 10 patients were subject to vasospastic episodes (mainly Raynaud's disease). One was also a severe hypertensive. Their average age was 35 years, and all were females. Where relevant these groups are analysed separately.

EFFECTS OF INTRAVENOUS INJECTION (400–500 MG.)

Subjective Effects.—Within 15–30 sec. of the injection a distinct taste is experienced, beginning on the tip of the tongue and spreading usually to the whole mouth and lips. Its quality is defined by different patients as bitter, metallic, burnt, tingling, pineapple, or disinfectant. It is a bizarre taste not previously experienced by the subject, persists a minute or two, and then passes away, to be followed by a dry mouth. Within the first 90 sec. "tinglings" are felt, starting in the hands, feet, and face in quick succession, and last a minute or so. During their presence no objective sensory loss can be detected. The taste and paræsthesiæ are constant findings with the 500 mg. dose but may be accompanied by a heaviness over the eyes, mild frontal headache, dizziness, a feeling of weakness, or a partial loss of visual accommodation.

Blood-pressure

In 47 out of 50 cases a significant fall of blood-pressure was recorded. This is maximal within 2 min. of the

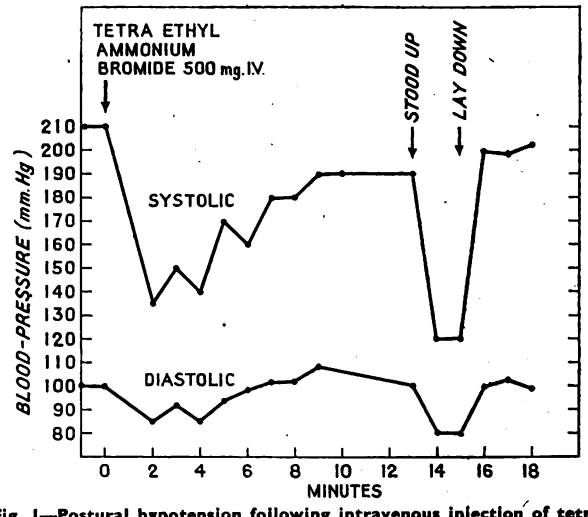

Fig. 1—Postural hypotension following intravenous injection of tetraethyl ammonium bromide in a man, aged 42, with diffuse obliterative arteritis and hypertension.

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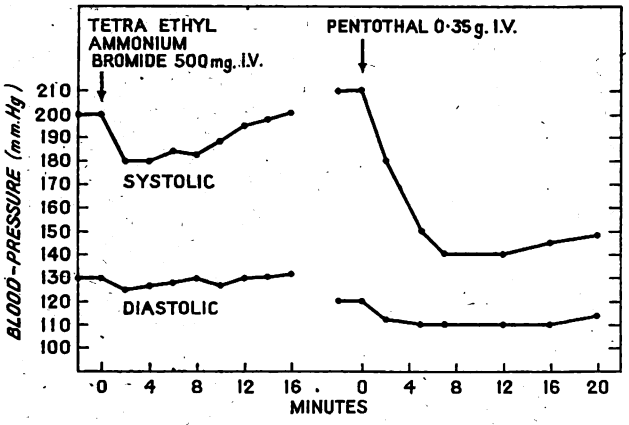

Fig. 2—Fall of blood-pressure after intravenous injections of tetraethyl ammonium bromide and of pentothal in a woman, aged 35, with Raynaud's disease and hypertension.

injection and gradually returns to normal in the next 10–20 min. The fall is less in patients with a normal blood-pressure than in the elderly hypertensive group. In those with normal blood-pressure the systolic reading dropped by 20–40 mm. Hg and the diastolic by 10–35 mm. Hg, whereas in the hypertensives a fall in the systolic of up to 80 mm. Hg and in the diastolic of 40 mm. Hg was not unusual. This accords with the findings of Birchall et al. (1947) and Lyons et al. (1947), who emphasise the danger of circulatory collapse following injections in hypertensive patients.

Even after the return to normal levels in the recumbent position, considerable postural hypotension can be demonstrated sometimes up to an hour later (fig. 1). The more striking falls in blood-pressure are usually followed by dizziness or light-headedness; and, if the erect posture is adopted too soon, the patient may faint. The degree of fall in blood-pressure had no apparent relationship to the severity or ætiology of the hypertension, and often the intravenous injection of 0·3 g. of 'Pentothal' at a later date would show a greater degree of resulting hypotension (fig. 2).

Tetraethyl ammonium bromide seems to have no advantages over the barbiturates as a prognostic index in selecting cases to be subjected to sympathectomy for their hypertension. This concurs with the findings of Lyons and Birchall.

In one normal and one vasospastic case the blood-pressure remained unchanged, whereas in another normal a slight pressor effect was seen. With dosages less than 400 mg., which are excluded from the general series, a proportionately less hypotensive response followed; thus, with 50 mg. the maximal systolic drop was 20 mm. Hg.

Pulse-rate

After tetraethyl ammonium bromide the pulse-rate rose proportionately to the fall in blood-pressure, reaching a maximum in the first minute and returning to normal in 5–20 min. With a pronounced hypotensive reaction the pulse-rate may rise by 50–60 beats per min. No arrhythmias were detected.

Pupils

A moderate dilatation of the pupil is often seen in the first 2 min. and lasts 20–30 min. No diminution in light-reaction accompanied this, but blurred vision and lack of accommodation were often complained of. We have never seen the ptosis described by several previous writers.

Skin Temperature

It was hoped that tetraethyl ammonium bromide would supply a simple method for determining the benefits to be expected from sympathectomy in peripheral vascular disease, especially since its presumed pharmacological action is by blockade of autonomic ganglia. It has indeed been suggested by Lyons et al. (1947) and Coller et al. (1947) that this is so, but they do not indicate what proportion of their cases reacted by full vasodilatation to injections of tetraethyl ammonium bromide as compared with other proved standard methods, such as local nerve and paravertebral block. Our results have been disappointing.

The skin temperature was read with the thermocouple from the toes and the fingers, and in 3 cases full vasodilatation (up to 31–33°C) was obtained on the digits. Two of these were normals and one a patient with Raynaud's disease. The temperature returned to its basal level in 15–18 min. Submaximal vasodilatation (rise of 3–4°C) was seen in another 20% of the normals and vasospastics, but the rest did not show any increase in skin temperature. Nor was the occasionally slight rise of temperature obtained in the obliterative group of prognostic value, as is illustrated by fig. 3, where 500 mg. of tetraethyl ammonium bromide did not lead to any rise in the skin temperature of the toe, and a later procaine block of the paravertebral sympathetic ganglia showed a prolonged and pronounced response, which corresponded to that resulting later from lumbar sympathectomy.

No rise of skin temperature after the injection of tetraethyl ammonium bromide was seen in limbs already "sympathectomised" by lumbar ganglionectomy. Repeated daily injections never produced a rise in skin temperature

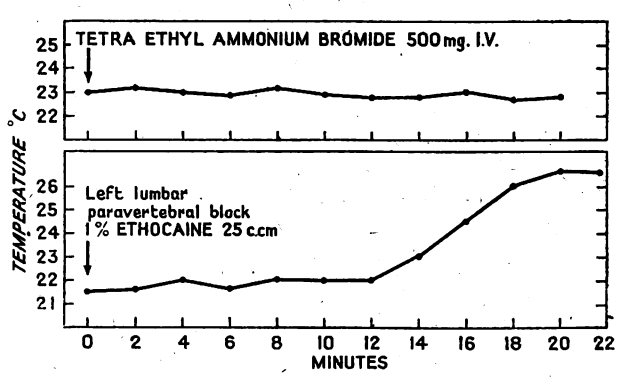

Fig. 3—Rise in skin temperature of toe after intravenous injection of tetraethyl ammonium bromide and after paravertebral block in a man, aged 52, with mitral stenosis and emboli in both femoral arteries.

where the first injection had failed to do so. Smaller doses of 50–250 mg. had a proportionately smaller effect. The statement of Lyons et al. (1947) that the drug "has proved to be as reliable as paravertebral block or local nerve block" for testing peripheral vasodilatation response has therefore not been substantiated by us. Our findings suggest that, except for isolated instances, paravertebral or local nerve block will produce an increase in skin temperature some three to six times as great as that yielded by tetraethyl ammonium bromide and for a longer period.

Skin Resistance

The electrodes were placed in position about 30 min. before the injection of tetraethyl ammonium bromide so that the skin resistance could reach a stable value. The amplitude of the displayed pulse was adjusted to a reference point on the scale. In most cases, when the patient observed the hypodermic syringe or felt the needle prick, the skin resistance was lowered. The resistance returned to normal in about 5 min. In cases where the skin temperature rose a correlated rise in skin resistance was obtained. The rise in resistance lasted

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rather longer than the rise in skin temperature, the resistance returning to normal in about 50 min.

DISCUSSION

The subjective phenomena and the changes in the pupils, blood-pressure, and pulse-rate in our series approximate to those described by Lyons et al. (1947) and Coller et al. (1947). Strikingly divergent results, however, were obtained by us in the frequent lack of peripheral vasodilatation. In our hands tetraethyl ammonium bromide has a limited practical value in the study of the peripheral vascular response to sympathetic block and in no way compares with such reliable and proved tests as local nerve block or paravertebral block. The preliminary findings of DeBakey (1947) seem to agree closely with ours and substantiate Burn and Dale's (1915) original experiments on animals in that intravenous tetraethyl ammonium bromide in an unpithed animal gives variable and unpredictable results.

SUMMARY

Some subjective and objective phenomena following intravenous tetraethyl ammonium bromide are described.

It is concluded that tetraethyl ammonium bromide as a prognostic test in peripheral vascular disease does not compare favourably with local nerve and paravertebral block.

We are grateful to Messrs. May and Baker Ltd. for providing the drug used in this series.

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TETRAETHYL AMMONIUM BROMIDE IN HYPERTENSION AND HYPERTENSIVE HEART-FAILURE

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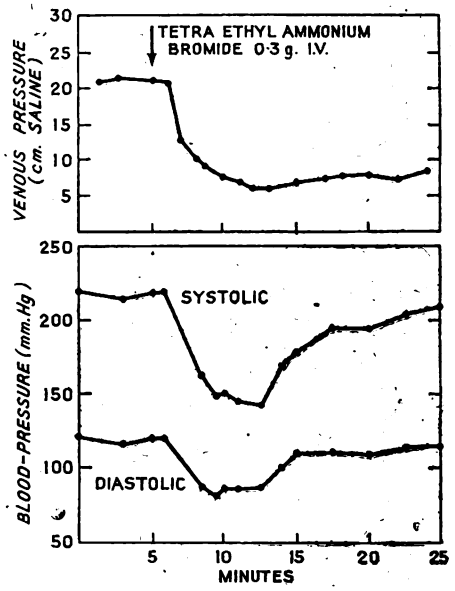
THE studies of Acheson and Moe (1946) and Acheson and Pereira (1946) have shown that intravenous injection of tetraethyl ammonium salts in animals produces ganglionic block of the efferent sympathetic vasoconstrictor impulses and a marked fall in blood-pressure. Similar effects are produced in man by the administration of tetraethyl ammonium salts parenterally, and temporary paralysis of autonomic ganglia can safely be produced by their use (Berry et al. 1946, Lyons et al. 1947).

The present investigation was undertaken to determine whether the administration of tetraethyl ammonium bromide (T.E.A.B.) would be a useful preoperative test in the selection of hypertensive patients for sympathectomy.

It is uncertain whether the increased peripheral resistance in essential hypertension is due to neurogenic vasoconstriction of the peripheral arterioles or to the presence of a circulating pressor substance, but operations on the sympathetic nerves are designed to lower the blood-pressure by producing vasodilatation in the splanchnic area.

The usual preoperative test for lability of the blood-pressure is to measure it during sleep, and for this purpose sedation with 'Sodium amytal' (0·2 g. hourly for 3 doses) is used.

By temporarily paralysing the sympathetic ganglia and blocking the sympathetic vasoconstrictor impulses T.E.A.B. might indicate whether release of vasoconstrictor tone is likely to produce a significant fall in blood-pressure or not, and so eliminate those patients with permanent organic changes in the vessel-wall who will be unsuitable for operation. In 10 hypertensive patients who had a transthoracic splanchnic neurectomy performed the blood-pressure readings obtained preoperatively with T.E.A.B. and with sodium amytal have been compared with those found two weeks after the completion of the operation. Observations have also been made on the effects of administration of T.E.A.B. to patients with hypertensive heart-failure.



Lowering of venous pressure and blood-pressure after intravenous T.E.A.B.

METHODS

The T.E.A.B. was given intravenously in a 10% solution, in a dose of 0·3–0·5 g. (4–6 mg. per kg. of body-weight). The injection was given slowly, and the patient was kept recumbent for 30–40 min. after injection. Direct venous-pressure readings were made in the antecubital vein, and are expressed in cm. of saline above the sternal angle. A recording spirometer was used for measurements of vital capacity and pulmonary ventilation. All preoperative and postoperative blood-pressures were recorded with the patient lying down.

RESULTS

In a preliminary group of 30 patients with essential hypertension the comparative effects of T.E.A.B. and sodium amytal were studied. The results corresponded closely with those reported by Lyons et al. (1947). The average fall in blood-pressure with T.E.A.B. was 58 mm. Hg systolic and 28 mm. Hg diastolic, as compared with 74 mm. Hg systolic and 35 mm. Hg diastolic with sodium amytal. No untoward effects were produced by T.E.A.B., and in all cases its action was transient.

The results in the 10 patients who were operated on (removal of the sympathetic chain and ganglia from D6 to L1) are shown in table I. The operation led to a fall in diastolic blood-pressure of at least 20 mm. Hg in every case, with an average of 33 mm. Hg for the whole group. The postoperative blood-pressures were recorded two weeks after the completion of the second stage of the operation, and were usually the lowest levels reached. Often there was a subsequent rise over

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the next three months, but sufficient time has not yet elapsed for the final results of operation to be assessed. The diastolic pressure in the preoperative test with T.E.A.B. agreed within 10 mm. Hg with the postoperative level in 7 of the 10 cases. With the sodium-amytal test agreement to a like degree was reached in 9 cases out of 10. The postoperative response of patients to a subsequent injection of a similar dose of T.E.A.B. is interesting: 4 patients were investigated, and in each case the blood-pressure fell to a level lower than that reached in the preoperative test. The significance of these findings is discussed below.

Observations were made on 6 patients with hypertensive heart-failure. Since the effects of intravenous injections are of short duration, intramuscular injections of 1 g. were given in some cases. Subjectively, all patients were improved temporarily, the degree of dyspnœa and orthopnœa being less during the phase of lowered blood-pressure and often for some hours afterwards. The average fall in blood-pressure in these patients was 60 mm. Hg systolic and 36 mm. Hg diastolic. With intravenous injections the venous pressure fell rapidly, especially if it had been initially raised (see figure), and it tended to remain low after the blood-pressure had returned to its original level. The vital capacity rose by an average of 13%, the pulmonary ventilation per min. by 42%, and the amount of tidal air by 21% (table II). Electrocardiograms taken when the blood-pressure had reached its lowest level showed no change apart from an increase in heart-rate. The ventricular complexes, whether initially normal or abnormal, remained unchanged.

DISCUSSION

The experience of Berry et al. (1946), who gave tetraethyl ammonium salts in 500 cases of peripheral vascular disease, and of Lyons et al. (1947), who gave over 4000 injections, has shown that paralysis of autonomic ganglia in man by the administration of the drug is safe, no serious untoward effects being seen. In the present investigation there were no toxic effects; and, apart from transient tingling, visual changes, and a feeling of weakness, the patients experienced no discomfort, provided they lay down for 30 min. after the injection. A feeling of faintness is common if the patient stands soon after the injection, and is due to a sudden postural hypotension. A sudden fall in blood-pressure in elderly patients with hypertension and coronary-artery disease might be expected to increase the hazard of acute coronary insufficiency, but no case of angina pectoris or of coronary thrombosis following administration of tetraethyl ammonium salts has been reported. Lyons has actually given the drug in 2 cases of myocardial infarction, with complete relief of pain. Pharmacologically it might be expected that administration of large doses of any of the quaternary salts would produce muscular paralyses (Ing 1936). These have been reported by Birchall et al. (1947) with tetraethyl ammonium chloride; in their series of 8 patients with hypertension who were given intravenously a dose of 33 mg. per kg. of body-weight, a curariform effect was observed, with dysarthria, dysphagia, and paralysis of the respiratory muscles. In the present study the intravenous dose was 4–6 mg. per kg. of body-weight and no such effects were seen. At present it seems wise not to exceed a total dose of 0·5 g. for any single injection.

TABLE I—BLOOD-PRESSURE CHANGES AFTER T.E.A.B. AND SODIUM AMYTAL, COMPARED WITH POSTOPERATIVE LEVELS

Case no.	Age (yr.)	Sex	Diagnosis	Blood-pressure (mm. Hg)				
				Initial	After T.E.A.B.	After sodium amytal	Post-operative	Post-operative T.E.A.B.
1	30	M	Hypertension	180/120	130/80	130/80	120/70	94/64
2	51	M	,,	210/140	140/90	120/90	150/100	..
3	46	F	,,	210/134	154/100	140/98	178/110	120/88
4	48	M	,,	220/135	155/130	150/110	168/110	130/105
5	44	F	Hypertension, left bundle-branch block	196/108	136/96	125/90	130/85	..
6	52	M	Hypertension	180/110	136/92	120/88	120/80	..
7	38	M	,,	180/120	136/104	138/98	160/100	120/80
8	48	M	,,	280/150	208/125	180/112	205/120	..
9	45	F	Malignant hypertension	260/140	224/140	180/115	205/120	..
10	22	M	,,	200/150	128/94	140/104	140/100	..

TABLE II—EFFECTS OF ADMINISTRATION OF T.E.A.B. IN HYPERTENSIVE HEART-FAILURE

Case no.	Blood-pressure (mm. Hg)	Venous pressure (cm. saline)	Vital capacity (l.)	Respirations per min.	Pulmonary ventilation (l./min.)	Tidal air (c.cm.)
11	Before 160/100	..	3·2	15	7·0	466
	After 90/64	..	3·7	18	11·5	640
12	Before 200/125	+21	1·6	..	..	..
	After 140/80	+ 6	1·9	..	..	..
13	Before 160/100	+18	1·9	19	8·5	447
	After 90/60	+ 3	2·3	21	10·5	500
14	Before 250/140	..	2·3	11	6·9	627
	After 220/120	..	2·5	13	7·3	561
15	Before 140/96	+ 9	2·1	16	5·6	350
	After 94/78	+ 2	2·2	19	9·8	516
16	Before 225/120	+ 6	1·7	..	..	..
	After 140/80	0	1·9	..	..	..

Owing to lack of knowledge of the fundamental cause of the increased peripheral resistance in human hypertension, operations designed to lower the blood-pressure by causing vasodilatation in the splanchnic area are empirical. In some cases, however, lowering the blood-pressure in this way will cause definite improvement in hypertensive symptoms, improvement in effort tolerance, and occasionally diminution in size of a hypertrophied left ventricle. In the selection of cases for operation it is important to have some preoperative test for lability of the blood-pressure, the results of which agree fairly closely with the level of blood-pressure found after operation. The T.E.A.B. test used in this investigation is safe, quick, and easy to carry out without discomfort to the patient, but in the present small series of cases it has not been so reliable as the sodium-amytal test. Birchall et al. (1947) studied 12 cases with the same two tests and found no agreement between the results obtained and the postoperative blood-pressures. However, in only 2 of their 12 cases who had a lumbodorsal sympathectomy and ganglionectomy performed was there a significant fall in blood-pressure as the result of the operation.

The greater fall in blood-pressure which takes place when T.E.A.B. is given postoperatively is difficult to explain, since the figures are in each case lower than those obtained preoperatively with the same dose. One possible explanation is that T.E.A.B. in the dose used in this investigation is less effective than sympathectomy in producing vasodilatation, and that only incomplete paralysis of the sympathetic ganglia is obtained. Thus in the postoperative test the combined effect of maximal (surgical) vasodilatation in the splanchnic area and partial vasodilatation elsewhere will be greater than that obtained with the drug alone in the preoperative test, and the blood-pressure will be lower. This view is supported by measurements of the rise in skin temperature after sympathetic block in a few cases of peripheral vascular disease (Hayward 1947). In each case the rise in temperature after surgical sympathetic block was greater than that obtained with T.E.A.B.

In patients with hypertensive heart-failure T.E.A.B. usually relieves orthopnœa and dyspnœa and causes the vital capacity, tidal air, and pulmonary ventilation per min. to increase and the venous pressure to fall.

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Apart from the sudden fall in blood-pressure these changes resemble those seen after venesection and are probably due to a decrease in pulmonary congestion. With intravenous administration these effects are of short duration, but with intramuscular administration they last 2–8 hours. Besides their action on autonomic ganglia, tetraethyl ammonium salts may have a direct action on the heart, and in animals an effect similar to that of the cardiac glucosides on the failing heart-lung preparation has been reported (Acheson and Moe 1945), with a decrease in heart volume and venous pressure and an increase in systemic output. Because of its action in reducing pulmonary congestion, T.E.A.B. may be useful in the emergency treatment of paroxysmal nocturnal dyspnœa or of acute pulmonary œdema due to acute left ventricular failure. No reports are yet available concerning the value of T.E.A.B. in chronic congestive failure. It appears unlikely that T.E.A.B. would produce a diuresis in such cases; for, when the blood-pressure falls after intramuscular administration, the glomerular filtration-rate is diminished in proportion to the extent of the fall. If there is a significant fall, the volume of urine is moderately reduced (Lyons et al. 1947).

The circulatory dynamics of the fall in blood-pressure after the administration of T.E.A.B. in man have been studied by Lyons et al. (1947), who found that the cardiac output, measured with the ballistocardiogram, is increased up to 20%, and ascribed the fall in blood-pressure entirely to a lowering of the peripheral resistance as a result of blocking the efferent sympathetic vasoconstrictor impulses. Measurements of venous pressure in the present investigation show that the pressure falls considerably in all cases of hypertension, with or without heart-failure. The heart-rate increases equally in both groups, but in those with heart-failure a reduction in the venous filling pressure of the heart would tend to cause an increase in cardiac output, whereas in the absence of heart-failure the output should fall (McMichael and Sharpey-Schafer 1944, Howarth et al. 1946). The fact that the average fall in blood-pressure produced by T.E.A.B. is practically identical in the two groups of cases supports the view that the fall is produced only by a lowering of the peripheral resistance. However, until accurate measurements of cardiac output are available, no definite conclusions can be reached about the part played by alterations in cardiac output in lowering the blood-pressure.

SUMMARY

The administration of T.E.A.B. to patients with essential hypertension leads to a considerable fall in blood-pressure in nearly all cases. This is caused by paralysis of the autonomic ganglia, with a resultant blocking of the efferent sympathetic vasoconstrictor impulses. After intravenous injection of T.E.A.B., the blood-pressure remains low for 5–30 min. and after intramuscular injection for 2–8 hours.

No toxic effects of T.E.A.B. have been encountered with an intravenous dose of 4–6 mg. per kg. of body-weight.

The preoperative blood-pressures after the injection of T.E.A.B. and after administration of sodium amytal have been compared with those found two weeks after operation in 10 patients on whom a transthoracic splanchnic neurectomy was performed. The diastolic blood-pressure in the preoperative test with T.E.A.B. agreed within 10 mm. Hg with the postoperative level in 7 cases out of 10, as compared with 9 cases out of 10 with sodium amytal.

T.E.A.B., in the dose used, is less effective than sympathectomy in producing a maximal degree of vasodilatation.

Patients with hypertensive heart-failure have temporary relief of orthopnœa and dyspnœa when the blood-pressure is lowered with T.E.A.B. There is an increase in the vital capacity, tidal air, and pulmonary ventilation per min., with a fall in venous pressure. Pulmonary congestion is probably diminished as a result of the extensive peripheral vasodilatation.

T.E.A.B. may be useful in the emergency treatment of acute left ventricular failure. In patients with chronic congestive failure the fall in urinary output which results from the lowering of blood-pressure makes the use of T.E.A.B. inadvisable at present.

I am indebted to Mr. E. G. Tuckwell for allowing me access to his postoperative records of these patients, and to May and Baker Ltd. for supplying the drug. This work was carried out during tenure of a Mackenzie Mackinnon research fellowship.

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FOLIC ACID IN NUTRITIONAL ANÆMIA

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IN January, 1947, we obtained a small supply of folic acid, and we have studied its effects on cases of severe anæmia in Medical College Hospital, Calcutta.

Davidson and Girdwood [1] indicate that folic acid is effective in pernicious anæmia, in some cases of refractory megaloblastic anæmia, and in nutritional macrocytic anæmias. The results in sprue vary according to the degree of malnutrition present, but there is a definite beneficial effect on the intestinal tract. It is ineffective in aplastic anæmia, in iron-deficiency anæmia, and on the blood of sprue cases where there is failure of absorption. Carruthers,[2] in India, has reported a rapid improvement in cases of diarrhœa treated with folic acid; this improvement was not always maintained when folic acid was withdrawn.

Good results have been reported by Das Gupta and Chatterjea [3] in selected cases of nutritional macrocytic anæmia. They emphasise that better responses were noted when the bone-marrow, though megaloblastic in reaction, showed a fair amount of normoblastic erythropoiesis.

The ten cases which we have studied were not so carefully selected as those of Das Gupta and Chatterjea. Our only criteria were that the anæmia should be severe and not of pure iron-deficiency type. We have avoided using our meagre supplies of folic acid in grossly complicated cases. The results are given in the accompanying table.

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RESULTS OF TREATMENT OF SEVERE NUTRITIONAL ANÆMIA WITH FOLIC ACID

Case no.	Age (yr.) and sex	Religion	Red cells per c.mm.	Hb (g. per 100 ml.)	White cells per c.mm.	M.C.V. (c.μ)	M.C.H.C. (%)	Megaloblasts in marrow	Total folic acid (mg.)	Days treated	Other treatment
1	21 F	Muslim	710,000 3,900,000	2·5 9·0	6200 4200	128 84	27 27	None None	540	27	None
2	26 M	Muslim	990,000 3,160,000	2·5 8·0	1600 3600	94 103	31 25	A few None	680	34	Oil of chenopodium and iron
3	42 M	Hindu	2,100,000 2,510,000	3·6 9·0	3700 5000	118 —	34 —	None None	200	10	None
4	35 F	Muslim	560,000 4,200,000	2·0 8·5	6800 —	140 80	30 26	None None	980	49	None
5	34 F	Jewish (European)	1,900,000 3,300,000	7·2 10·8	6600 7200	146 103	25 33	3% —	360	18	None
6	15 M	Muslim	860,000 3,800,000	3·2 8·5	4600 —	137 80	29 28	Present —	440	22	Urea stibamine, quinine (no response)
7	30 F	Hindu (Gurkha)	1,900,000 2,160,000	4·7 5·2	1600 —	94 90	25 27	2% —	420	21	Sulphadiazine, urea stibamine (very slow response)
8	30 F	Hindu	690,000 2,380,000 2,820,000	2·0 6·5 7·1	2200 2600 —	133 — —	25 — —	8% — —	440 —	22 —	Liver extract I.M. 16 ml. in 8 days
9	19 M	Hindu	1,800,000 1,390,000 4,200,000	2·5 2·5 7·0	6200 5400 —	— 80 106	— 23 20	2% — 5%	— 640	— 32	Liver extract I.M. and ferrous sulphate
10	25 F	Hindu	580,000 1,680,000 4,300,000	2·5 4·8 11·0	5700 4400 —	140 91 115	35 22 22	9% — —	810 —	41 —	Liver extract I.M. and ferrous sulphate

DISCUSSION

Davidson and Girdwood[1] consider that folic acid is the factor which is essential for the continuation of normoblastic blood-formation and that a deficiency causes a reversion of the bone-marrow to the megaloblastic state.

In a recent survey of anæmic patients in this hospital we found that a dimorphic anæmia was very common. The ten cases tabulated here were of this type. All except case 5 showed evidence of gross malnutrition. These dimorphic anæmias often showed a poor response to liver and iron, so the rapid and maintained response to folic acid was remarkable.

Cases 1, 4, 8, and 10 were examples of the nutritional macrocytic anæmia often seen in women after childbirth. On admission they were extremely weak and unable to stand, with red-cell counts about 500,000 per c.mm. and Hb about 2 g. per 100 ml. Previously this type of woman was given a blood-transfusion immediately and liver injections, but often the reaction was severe and they died. Since using folic acid on this type of case we have had no fatalities. The response has always been rapid, and concomitant symptoms, such as diarrhœa, fever, and œdema, have cleared with no other treatment.

Case 9 was remarkable in that he did not respond to treatment with liver and iron for 15 days. His blood picture began to deteriorate, and œdema with ascites remained unaltered. Within 5 days of the start of folic-acid treatment he showed much general improvement. The œdema, fever, and diarrhœa lessened and finally disappeared, and the blood picture improved steadily.

Cases 3 and 7 were unsatisfactory. In case 3 bacillary dysentery was present as a complication, but in spite of this there was an improvement in the blood picture. Folic acid was stopped because we did not wish to use it in cases which did not show an immediate response, our supply being limited. Probably, had we continued (after a course of sulphaguanidine for the dysentery), the blood would have responded better. Case 7 was jaundiced, and hepatitis may have had an adverse effect on our treatment.

Megaloblasts were present in the bone-marrow in seven out of the ten cases. The peripheral-blood picture was usually dimorphic, and in case 9 normocytic and hypochromic. There were no cases of pure iron-deficiency anæmia. It was found impossible to keep patients in hospital long enough to obtain a normal healthy blood-count.

CONCLUSIONS

It is doubtful whether we are justified in drawing conclusions from so few cases, but the following suggestions are made:

(1) Folic acid in doses of 10 mg. twice daily gives a rapid hæmatological response in nutritional macrocytic anæmia. An equally rapid improvement is noted in the diarrhœa, fever, and œdema often present in these cases.

(2) Folic acid is effective in nutritional anæmia whether the bone-marrow is normoblastic or megaloblastic.

(3) Folic acid is superior to liver extract in the treatment of nutritional macrocytic anæmia. This assumption is warranted by our previous experience of treating these cases with liver, when the response was often slow and unsatisfactory.

(4) Folic acid produces a rapid and effective response in the very severe nutritional anæmia often seen in women after childbirth. It is superior to treatment by blood-transfusion, because there is no danger of a reaction and the response is more lasting.

(5) Folic acid appears to have no toxic effects.

SUMMARY

The results of treatment with folic acid 10 mg. twice daily in ten cases of nutritional anæmia are reported.

Eight of these cases showed a very satisfactory response. Of the two less satisfactory cases one was complicated by bacillary dysentery and the other by hepatitis and jaundice.

The peripheral blood was almost constantly dimorphic.

It is argued that folic acid is superior to liver in the treatment of nutritional macrocytic anæmia.

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Preliminary Communication

STREPTOMYCIN IN HUMAN PLAGUE

IN a clinical trial of streptomycin in human plague the following strict conditions were observed: (1) it was administered alone, without adjuvants which might vitiate the results; (2) it was given only to bacteriologically proved cases of plague; and (3) it was used only in moribund patients.

The outbreak of plague in question occurred in the Anantapur district of Madras Presidency, and so far 152 cases have been observed, with 66 deaths—a case-mortality of 43·4%. Case-records and temperature charts are here given of the 5 patients who were treated with streptomycin and are alive and well today.

Case 1.—A man, aged 25, was admitted on Sept. 28, 1947. He had had fever and headache for one day, with much pain and swelling in left groin. He had not been inoculated against plague.

On admission: temperature 99°F, pulse-rate 96, respirations 26 per min. Left femoral glands enlarged and tender. Gland puncture positive for *P. pestis*.

Treatment.—Sulphathiazole 12 g. by mouth in twenty-four hours. At 5.30 P.M. on the 29th patient's condition had become worse: temperature 106°F, pulse-rate 150, respirations 36 per min. He was desperately ill, semiconscious, with toxic myocarditis; heart sounds only faintly audible.

At 6 P.M. a course of intramuscular streptomycin 0·125 g. three-hourly was begun.

Progress.—On the morning of Oct. 1 patient showed signs of improvement and regained full consciousness. Streptomycin was discontinued on Oct. 3, when 4 g. had been given.

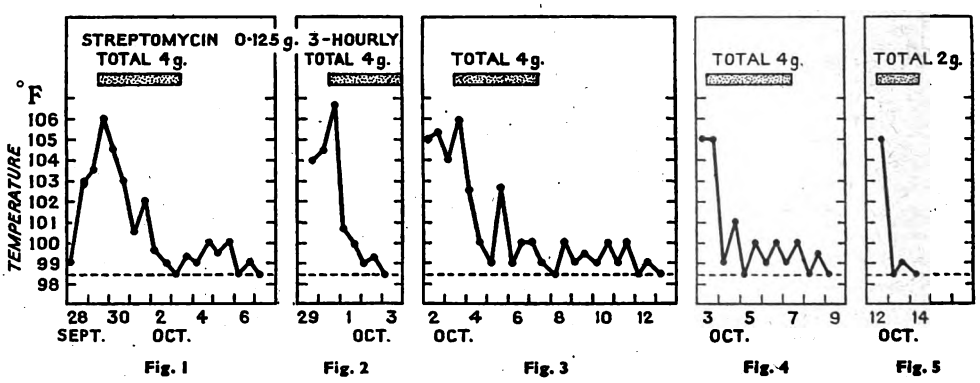

Fig. 1 Fig. 2 Fig. 3 Fig. 4 Fig. 5

Case 2.—A woman, aged 25, was admitted at 5 P.M. on Sept. 29 with two days' history of fever and a swelling in left groin. She had not been inoculated against plague.

On admission: temperature 104°F, pulse-rate 144, respirations 36 per min. Left inguinal glands enlarged and very tender. Gland puncture yielded *P. pestis*.

Treatment.—Sulphathiazole 12 g. in twenty-four hours. But at 3 P.M. on Sept. 30 patient was highly toxic and comatose, with face flushed, temperature 106·6°F, pulse-rate 160, respirations 46 per min. Streptomycin therapy was therefore instituted.

Progress.—Next morning patient regained consciousness and thereafter rapidly improved. Streptomycin was discontinued at noon on Oct. 4, when 4 g. had been given.

Case 3.—A woman, aged 22, was admitted at noon on Oct. 2 with two days' history of fever with pain and slight swelling in right groin. She had been inoculated against plague six days before admission.

On admission: temperature 105°F, pulse-rate 152, respirations 36 per min. Right femoral glands enlarged and slightly painful. Gland puncture yielded *P. pestis*.

Treatment.—Immediate intramuscular injection of antiplague serum 60 ml. plus 1 in 1000 adrenaline hydrochloride. Intravenous injection of 25% glucose 10 ml. Sulphathiazole 12 g. in twenty-four hours.

Patient became unconscious at 3 P.M. on Oct. 3, with temperature 106°F, pulse-rate 158, and respirations 42 per min. Streptomycin therapy was therefore instituted.

Progress.—Patient regained consciousness on the morning of Oct. 5 and thereafter rapidly improved. Streptomycin was discontinued at noon on Oct. 7, a total of 4 g. having been given.

Case 4.—A girl, aged 16, was admitted at 10 A.M. on Oct. 3 with two days' history of fever with swelling in right groin. She had not been inoculated against plague.

On admission: temperature 105°F, pulse-rate 154, respirations 36 per min. Patient comatose. Right femoral glands enlarged. Gland smear yielded *P. pestis*.

Treatment.—Intramuscular injection of antiplague serum 60 ml. plus adrenaline 0·5 ml.; intravenous injection of 10% glucose 10 ml.

At 3 P.M. on Oct. 3 patient's condition was worse, so streptomycin therapy was begun.

Progress.—On the morning of Oct. 5 patient regained consciousness and thereafter improved, and streptomycin was discontinued at noon on Oct. 7, a total of 4 g. having been given.

Case 5.—A boy, aged 13, was admitted at 8 P.M. on Oct. 12 with two days' history of fever with swelling in left groin. He had been inoculated against plague six days before admission.

On admission: temperature 105°F, pulse-rate 156, respirations 46 per min. Left femoral glands slightly enlarged and painful. Patient semiconscious. Gland smears yielded *P. pestis*.

Treatment.—Streptomycin therapy was instituted immediately.

Progress.—Patient regained consciousness next morning and rapidly improved. Streptomycin was discontinued at 6 P.M. on Oct. 14 after 2 g. had been given.

SUMMARY

Five moribund patients with plague were treated with intramuscular streptomycin 0·125 g. three-hourly for 72–96 hours.

The response was very good. Improvement was noted when 1·5 g. had been given—i.e., within 36 hours.

Larger initial doses were not tried, because the stock of streptomycin was exhausted and further supplies were not obtainable.

Streptomycin appears to be a potent drug for the treatment of human plague.

No toxic effects resulting from the drug were observed.

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". . . Nowhere is there a well planned and integrated service for the chronically ill. . . . A common fault is the lack of continuity of treatment. Rarely has the patient one medical adviser who can work out with him a long-range plan for rehabilitation. . . . Much of the chronic illness that floods the outpatient clinics is still in the earlier and more hopeful stages. Clinic treatment is too often unsatisfactory. Yet it is only when his disease is so far advanced that he is completely, and probably permanently, disabled that the chronically ill patient can gain admission to a hospital."—Dr. ERNST P. BOAS in *Medical Addenda*, Commonwealth Fund, London, 1947.

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Medical Societies

MANCHESTER MEDICAL SOCIETY

Renal Function in Disease

AT a meeting of this society on Dec. 3, Prof. ROBERT PLATT said that the syndrome of renal failure was characterised by a steady deterioration in the power of the kidney to produce a concentrated urine. In the later stages the urine was pale, copious, and dilute, with a fixed specific gravity of about 1010. When the functional power of the kidney was insufficient for the excretory needs of the body the symptoms of uræmia developed. These were caused not only by retention of the waste-products of metabolism but by a general disturbance of electrolytes, including sodium, potassium, chloride, calcium, and phosphates. The symptoms of uræmia—weakness, anæmia, anorexia, vomiting, wasting, drowsiness, and coma—must be clearly distinguished from the more dramatic symptoms of hypertension (such as severe periodic headache, retinal disturbances, convulsions, and paralyses) which so often coexisted and confused the picture.

As regards the loss of concentrating power in renal failure, the underlying pathology common to all cases was loss of nephrons; and the lack of concentrating-power was usually ascribed to failure of the tubule cells in their function of elaborating a highly differentiated urine. This theory was unsatisfactory, however, because Rose Bradford showed fifty years ago that surgical removal of most of the kidney caused the remainder to secrete urine of the same type—copious, dilute, and of low specific gravity—and it was inconceivable that the remaining nephrons in the circumstances of this experiment should suddenly develop tubular failure. E. B. Verney and F. R. Winton had shown many years ago that an increase in glomerular pressure would also give rise to a urine of this type. More recent investigation by inulin and diodrast clearance tests had shown that the filtration fraction in chronic renal disease was high, which suggested that there was, in fact, a high glomerular pressure. Professor Platt suggested that if this was so, it was brought about simply by a large amount of blood perfusing a small number of nephrons. No humoral mechanism was involved, because renal failure might exist in one kidney while the other kidney was secreting a normally concentrated urine.

If it were accepted that a high glomerular pressure accounted for the character of the urine in renal failure, this did not rule out the possibility in some cases of coexisting tubular failure; but failure of the tubule cells should give rise to glycosuria, which was never present in chronic renal disease. Moreover, the histology of chronic nephritis showed in general that in areas of tubular atrophy the glomeruli were non-functioning, whereas the few remaining glomeruli were surrounded by apparently active and dilated tubules.

Considering the question of œdema in acute nephritis, Professor Platt said that this was not due to hypoproteinæmia, nor to heart-failure. Current literature still attributed it to increased capillary permeability; but this view, never satisfactory, was based on discredited observations on the protein content of the œdema fluid in acute nephritis. He suggested that low glomerular pressure would account for scanty urine of high specific gravity, which was typical of the early stage of acute nephritis and would lead to increased reabsorption in the tubules, giving rise to fluid retention and œdema. Inulin and diodrast clearance tests supported this hypothesis by showing a low filtration fraction. Recent work in Manchester and elsewhere suggested that there was hæmodilution with a high blood volume in the early stages of acute nephritis—a condition which supported the theory that the kidney was primarily at fault and was strong evidence against the theory of capillary permeability.

Finally, Professor Platt described the recent work of Trueta, Barclay, and others which had shown that the renal circulation could be largely diverted from the cortex into the medulla; and he discussed the bearing of these researches on such states as reflex anuria and cortical necrosis of the kidney.

Reviews of Books

Rheumatism and Soft Tissue Injuries

JAMES CYRIAX, M.D. Camb., physician, department of physical medicine, St. Thomas's Hospital. London: Hamish Hamilton. 1947. Pp. 410. 42*s*.

THIS book deals with those obscure painful conditions of the limbs and back which are so common in general practice and yet so poorly understood by most of our profession. The difficulty arises from the patient's failure to localise muscular and ligamentous pain with accuracy, and his tendency to refer the pain over a segmental distribution. We still tend to look for disease at the place where the pain is felt rather than at its source of origin, and we are not yet sufficiently aware of the frequency with which the source of pain lies altogether outside its distribution. Often an absence of gross pathological changes increases the difficulty of defining the source of pain, and we arrive at some sort of diagnosis by considering the features of the pain itself, together with the effect of procaine infiltration of its supposed source.

Dr. Cyriax describes a systematic method of clinical examination in which the segmental origin of a given pain is obtained by consulting the distribution of Foerster's dermatomes. (This is not entirely satisfactory as deep pain is not usually referred to the skin.) The piece of tissue giving rise to the pain is then defined by a comprehensive examination of active and passive movements of the part, followed by systematic palpation for tender spots, and finally by infiltration of these with local anæsthetic. The subject is dealt with regionally, with chapters on shoulder pain, backache, and so on.

Although the method appears logical enough, some of the conclusions reached are a little surprising. Thus under the heading of "radial perineuritis" we read of an epidemic disease characterised by pain extending from the scapula to the dorsum of the hand, with tenderness of the nerve behind the shaft of the humerus. To this may be added an isolated paralysis of the medial and lateral heads of the triceps and anæsthesia of the dorsum of the *distal* phalanges of the index and long fingers. "The diagnosis is confirmed by local anæsthesia"; but we are not told how. As the author blandly remarks, "the symptoms and signs of radial perineuritis and radial neuritis have nothing in common." In a later chapter we learn that "dural pain" is much the commonest cause of backache, and that lumbago is due to internal derangement of a lower lumbar joint. We are left with the feeling that a good idea has been developed somewhat uncritically.

The Psycho-Analytical Approach to Juvenile Delinquency

KATE FRIEDLANDER, M.D. Berlin, L.R.C.P.E., D.P.M., psychiatrist, Institute for the Scientific Treatment of Delinquency. London: Kegan Paul, Trench, Trubner. 1947. Pp. 296. 18*s*.

Dr. Friedlander's book is, and is meant to be, a contribution to Freudian literature. Reasonably enough, she uses a psychological definition of delinquency, and she is thus concerned with the Freudian approach to the delinquent character, which she carefully specifies. Roughly, this is the character which expresses the pleasure principle in the form of antisocial acts. The readers for whom the book is intended are probation officers, social workers, magistrates, psychiatrists, and education, health, and penal officers, and within the framework of the author's intentions it is decidedly good. Written in language that can be understood by all, it recapitulates concisely the Freudian view of character development, and surveys the development of faulty character and delinquent character from the same angle. The treatment section, however, sketches a non-Freudian psychotherapeutic approach, in addition to the orthodox psycho-analytical one.

The final part of the book gives Dr. Friedlander her chance: every aspect of society's attempt to deal with the delinquent is examined, criticised, assessed, and made the subject of constructive suggestions. The difficulties—very great—of treating the delinquent in or out of prison, or even under the shadow of the law, are analysed. Much of this part is a blueprint of

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what might be when public and officials have become more educated, and when the economic difficulties of this country, and the world, are less. She exposes the hopeless irrationality of much of the treatment of delinquency—the confinement of homosexuals in the exclusive society of their own sex, and the punishment of people whose psychopathology drives them again and again to seek that very punishment. Society, she holds, should deal humanely with its own failures, instead of meting out revenge, disguised as punishment.

She sets a high standard; but it is the weakness of any ideology that compromise comes hard. Dr. Friedlander has very little truck with the devil.

Ulcers of the Stomach and Duodenum

Technique of Surgical Treatment. EDMUNDO VASCONCELOS, professor of clinical surgery, University of Sao Paulo, Brazil. Sao Paulo: Editora Renuscença S.A. 1947. Pp. 125.

THIS volume—bound, alas, in paper covers—is in effect an atlas of operations for chronic peptic ulcer. Its page area of 9 in. by $11^3/_4$ in. makes it an awkward inhabitant of the surgeon's library, but accommodates drawings which are almost life-size. The drawings are models of what illustrations of operations should be—clear, well proportioned, and free of all unnecessary trimmings. The opening chapter describes the technique of spinal and of nerve-block anæsthesia. The former is preferred, and the latter used only in cases where a spinal is unsuitable. The nerve block consists in infiltrating the nerves supplying the abdominal wall with 1% 'Nupercaine' or 1% 'Neotutocain,' to each 200 ml. of which 1 ml. of 1/1000 adrenaline hydrochloride is added. Anæsthesia of the stomach is obtained, when the abdomen is opened, by freely infiltrating the gastro-hepatic omentum throughout its whole length, as well as the hepaticoduodenal ligament.

The technique of posterior no-loop isoperistaltic gastrojejunostomy is described, but emphasis is mainly laid on gastric resection. For ulcers of the body of the stomach the Polya operation is used; for ulcers high up on the lesser curve the Finsterer technique of suturing the lesser-curve aspect of the divided stomach, and making the gastro-enterostomy to the lower half of the cut surface, is practised. No attempt seems to be made to fashion a valve. Gastrectomy for duodenal ulcers is performed on similar lines, but if the ulcer is large and inseparably welded to the pancreas gastric resection with pyloric exclusion is used, the mucosa being cut away from the pyloric antrum.

The book will prove an attraction to all abdominal surgeons, and to those who are preparing to become so.

Physical Chemistry of Cells and Tissues

RUDOLF HÖBER, with the collaboration of D. I. HITCHCOCK, J. B. BATEMAN, D. R. GODDARD, and WALLACE O. FENN. London: J. & A. Churchill. 1945. Pp. 676. 42*s*.

THE principal author of this book is well known for his earlier *Physikalische Chemie der Zelle und Gewebe*. The wide advances since 1926, when the last edition of that work appeared, have linked still more firmly to general physiology these physicochemical foundations, though they have made it increasingly difficult to present a coördinated picture of the whole. The work of this symposium of authors will thus have a wide appeal. D. I. Hitchcock, of Yale, gives an outline of diffusion, reaction velocity, elements of thermodynamics, electromotive force, and some properties of solutions of which use is made later in the book. J. B. Bateman, of the Mayo Clinic, contributes a valuable résumé of the properties of large molecules, which recent work has so much clarified, and which have great architectural and functional significance in living matter. An important section by Höber develops these principles in relation to the cell; it includes a good account of permeability towards electrolytes and non-electrolytes, and a clear picture of the physical and chemical properties of the plasma membrane. In a discussion of the influence on cellular activity of various extracellular factors, emphasis is laid on analogies in the behaviour of simple colloidal systems; bio-electric potentials of cells and fibres are regarded largely from the same aspect. The treatment throughout is quite general, not collected under individual cellular types; and plant as well as animal cells receive attention. The accounts of narcotic action and of the influence of ions on the nervous system might perhaps have included fuller reference to the modern work of J. H. Quastel, R. W. Gerard, D. Nachmansohn, and others, who have attempted with some success to locate these actions in specific cell-enzyme systems. Their work would link up with the next part of the book, in which D. R. Goddard, of Rochester, gives an informative account of the metabolic aspects, especially the oxidation of carbohydrate. Fats and proteins and fermentation reactions as energy sources have been omitted. The best understood mechanism of energy transfer—well described here—is undoubtedly provided by the formation in oxidative reactions of phosphorylated intermediates of the type of adenosine triphosphate, in which the energy of the oxidation is stored and transferred by means of high energy phosphate groups resulting from intermediary oxidation of carbohydrate.

The final two sections are important. W. O. Fenn, of Rochester, contributes a study of contractile tissue, and Höber a stimulating account of the mechanism of absorption and secretion. Fenn also gives an account of muscle contractility, and reviews work correlating this with changes in the spatial configuration of the protein molecules. Since this section was written, in September, 1942, there have been so many additions to knowledge of structural proteins of muscle that the chapter needs to be supplemented, for instance by reading two later reviews[1] and the accounts of the discovery of the two new proteins of fibril—actin[2] and tropomyosin.[3]

Inter-Allied Conferences on War Medicine

Convened by the Royal Society of Medicine, 1942–1945. Hon. Editor: Major-General Sir HENRY TIDY, M.D., president of the conferences; Asst. Editor: J. M. BROWNE KUTSCHBACH, M.B. London: Staples Press. 1947. Pp. 531. 50*s*.

THIS volume contains communications delivered at conferences held by the medical services of the Allies at the Royal Society of Medicine, between December, 1942, and July, 1945. All were given under secrecy at the time: their publication now puts on paper an important series of war records, which are still valuable and in some cases vital pieces of medical experience and knowledge. The book is admirably put together. The 500-odd pages are divided into 13 sections, each of which contains 10–20 individual communications: sections on active operations, personal stories and experiences, and accounts of the German concentration camps are alongside more technical sections on tropical diseases, blood-transfusion, neuropsychiatry, venereal diseases, and the like. The contributions come both from our own and from other countries, many in particular from American speakers. The final section is devoted to reviews of progress made in war medicine and surgery since 1939, and it is interesting to see the emphasis laid by speaker after speaker on prevention, the psychological aspects of war medicine, discipline in hygiene, and first-class administration and organisation.

Sinn und Gehalt der Sexuellen Perversionen

M. BOSS, M.D. Zurich. Berne: Hüber. 1947. Pp. 130. Sw. fr. 12.

THIS is an attempt to comprehend the psychoanalytical and the "anthropological" explanation of sexual perversion in an existentialist statement which derives from Heidegger and Binswanger. The author holds that the sexual peculiarity of such patients is never an isolated symptom, but a sign of conflict ("disturbed dialectic") between love, with its quiet confidence that it is permanent, and "care" (Sorge), which is concerned with finite, mundane, material anxieties. He illustrates this abstract psychopathology with clinical records, and claims that, when applied, it has therapeutic value: but it is too full of philosophical generalisations to commend itself to any but a tiny fraction of practising psychotherapists or other doctors.

1. Bailey, K. Advances in Protein Chemistry, New York, 1944, p. 289. Englehardt, V. A. Advances in Enzymology, New York, 1946, p. 147.
2. Straub, F. B. *Stud. Inst. med. Chem. Univ. Szeged*, 1942, **2**, 3; *Ibid*, 1943, **3**, 23.
3. Bailey, K. *Nature, Lond.* 1946, **157**, 368.

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THE LANCET

LONDON: SATURDAY, JAN. 3, 1948

The Minister's Opportunity

FOR the profession in this country the year opens rather ominously. The National Health Service which is to be established in the summer embodies much that all of us have long desired, but its establishment threatens to cause those divisions within the profession that all of us are anxious to avoid. The Minister of Health's refusal, so far, to meet the British Medical Association's main objections to his scheme makes it at least possible that the plebiscite announced for Jan. 31 will yield a majority against service under the Act. If an adverse opinion were once clearly registered, charges of betrayal would then be made, both generally and individually, against those doctors who decided to join the service —the more so where they happened to gain a personal advantage by joining. We do not know how the Minister regards the situation that would thus arise; but for our own part we should doubt the wisdom of anyone, on either side, who was content to see the contest of 1911 reproduced in 1948.

In the coming plebiscite doctors will presumably be asked to say whether they favour participation in the National Health Service on the terms proposed by the Minister—a question that can be answered in the negative for many different reasons. It is true that the practical issues have narrowed, and that resistance to the Act now centres on its abolition of the sale of practices; but as things stand there is little hope of this cardinal question being considered on its merits, and opposition will come from some who would be ready to agree that sale and purchase is not really the best means of filling vacancies. As things stand, in fact, a large and perhaps decisive number of votes against participation will be cast by those who have been led to distrust the Government's motives and are now persuaded that private ownership of goodwill remains necessary as a safeguard against authority—a safeguard especially for the doctor's right and duty to treat his patient to the best of his ability without any prior allegiance to his "employer." The B.M.A. council's manifesto of Dec. 18 (published on p. 34) invokes once more the fear that the State as "paymaster" may become the bane of medicine; and though their case is overstated the council are right enough in urging that the doctor would do ill if he exchanged his professional freedom for advantages in organisation. The fact that these arguments have an emotional content does not prevent their being perfectly rational—provided we grant their underlying assumption that the profession should take no risks and trust nobody. The Minister's only effective answer to such arguments is to restore confidence, first by showing that the Act really does allow doctors to manage their own affairs, and secondly by proving himself willing to respect their wishes and meet their criticisms wherever this can be done without endangering the success of the scheme. To carry conviction, however, he will have to be conciliatory in deed as well as in word.

If the vote at the end of this month is to be anything approaching a straight vote on abolition of the sale and purchase of practices, which is the only essential part of the Act that is still in dispute, three subsidiary issues must be cleared out of the way. The first of these is the basic salary for all practitioners. On the one hand a basic salary may be looked on as a convenient device for smoothing the difficulties of doctors who have not yet acquired enough capitation fees to give them a livelihood: on the other hand, it can be represented as the first step towards making practitioners salaried State servants. If the former view is correct and it is merely a convenient device, it is not an integral part of the scheme and is not worth including at a heavy cost in suspicion and disquiet. If, on the contrary, Mr. BEVAN's critics should be right in alleging that it is being introduced by a Socialist Minister on ideological grounds, it would clearly be an intolerable imposition. Parliament has left the Minister free to reach agreement with the profession about the methods of remuneration best suited to the service, and he would go beyond his brief if he sacrificed agreement to the preconceptions of himself or his party. On this issue,[1] and likewise on the question of appeal by dismissed practitioners to the law-courts,[2] we have already urged concession to opinions which are by no means confined to opponents of the Act. Against appeal to the courts from his own final decision the Minister has a logical case but one which takes too little account of the British people's well-founded mistrust of bureaucracy and their reliance on an independent judiciary. The procedure he proposes should almost certainly ensure the doing of justice; but it falls short of ensuring also that justice will manifestly seem to be done, and the possibility of attaining this essential object needs further examination. Again on a legal plane, fresh consideration should be given to a third issue raised by the Negotiating Committee—namely, the doubt whether partnership agreements remain valid after the appointed day.

Just a year ago the impasse over negotiation was overcome, at the eleventh hour, by an exchange of letters between the Minister and the presidents of the Royal Colleges. Today the situation is perhaps more awkward but certainly as urgent, and we hope that by some similar expedient the Minister will again be given, and accept, an opportunity to justify his statement that he seeks the coöperation of the profession. Since it is now evident that in one of its features his proposed scheme of remuneration is widely deemed unacceptable, there would surely be nothing derogatory in his proposing an alternative scheme in which the basic salary either was reserved for special circumstances or was offered as an option. Again, nothing could be lost, and much might be gained, from an amplification of his remark that the doctor retains his "ordinary legal rights to go to the courts on the grounds of unlawful action by the Minister or others." And finally there seems to be no insuperable difficulty in the way of submitting to

1. *Lancet*, 1946, ii, 643.
2. *Ibid*, 1947, i, 143.

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Parliament a clarifying (not an amending) Bill which in a clause or two would remove uncertainty about the validity of partnership agreements. Immediate action in these three directions would go far to reduce the risk that the profession will this year find itself in formal if disunited opposition to a great and necessary reform. Founded in any case under material difficulties, the National Health Service will never prosper unless it gains the loyalty of its members, and the Minister responsible for its inauguration could scarcely be forgiven if he prejudiced that loyalty from the start. Yet that is what Mr. BEVAN will be doing if he relies on compliance when it is still open to him to persuade.

Sludged Blood in Disease

THE present fashion, it seems, is to ascribe a wide variety of diseases to a single cause or group of causes. Thus according to some writers all that is needed in many diseases is to adjust the particular adrenal cortical hormone that is missing or in excess. The latest example of these all-embracing pathologies—and one that may well prove of great importance—comes from Chicago, where KNISELY and his co-workers have discovered that in a long list of seemingly unrelated disorders the blood-cells circulating through small vessels are aggregated into masses (not rouleaux), so the blood is changed from a relatively free-flowing fluid to what is termed a circulating "sludge." The Chicago workers conclude that some of the clinical features of these diseases—if not of disease in general—are the consequences of having sludged blood in the smaller blood channels.

For sixteen years KNISELY and many others have been watching the blood flowing through arterioles, capillaries, and venules. They have used two methods: transillumination of thin portions of tissue such as mesentery, with light focused by fused quartz rods; and direct observation of obliquely illuminated conjunctival vessels with a dissecting type of microscope. The second technique has the great advantage that it can be used on the unanæsthetised human subject. Some important facts about *normal* blood have been learnt. In health the circulating red blood-cells remain discrete—in fact they slightly repel one another—and neither red nor white blood-cells ever stick to the lining of the small vessels. The cells pass along the vessels in an axial stream consisting of concentric layers one cell thick, with a layer of plasma between them and the vessel wall, the centre layer moving quickest. The flow in arterioles and venules over 60 μ in diameter is so rapid that individual cells cannot be distinguished. Normally the small vessels themselves do not allow appreciable amounts of fluid to escape. Almost every whole arteriole-to-capillary and sinusoid-to-venule pathway can contract against the blood-pressure along its entire length; these pathways can also dilate, but dilatation is limited by the vessels' fibrous envelope and by the surrounding tissues; if forcibly dilated, the vessels will leak plasma. The normal capillaries—the bottlenecks of the circulation—range in diameter from rather less than once to $2^1/_2$ times the diameter of a red cell, and they cannot dilate to much more than $2^1/_2$ times the diameter of a red cell without losing tonus. A further observation is that in living frog and monkey livers, although the normal red cells pass along the hepatic sinusoids in close contact with the phagocytic lining cells, they have never been seen to be ingested.

Such is the normal picture. The observations on blood-flow in disease, recently collated by KNISELY and his colleagues,[1] show a very different state of affairs. In disease, and often after relatively minor trauma, such as laparotomy, the red cells tend to stick together to form various forms of sludge. The simplest sludge contains cell clumps of about equal size that remain formed even when they are elongated or compressed by passing through the capillary bottleneck. Then there are "mixed sludges" containing clumps of different sizes together with free cells, the largest of these clumps being capable of blocking an arteriole. When such a mass sticks in an arteriole it gradually becomes spindle-shaped, sometimes aided by active arteriolar contraction, until it can pass on and so release the stoppage; but sometimes the plug remains fast. The presence of these sludges inevitably slows the blood-flow through the smaller vessels, the axial stream is disturbed, and the cell clumps tend to settle and be deposited along the vessel walls. This is particularly noticeable in those vessels which run horizontally or slightly uphill, and the clumps become cemented together to form large and stationary masses; many other factors are also involved, such as the stickiness of the clumps, their tendency to repel or attract other clumps, and the red-cell count—sedimentation being more rapid when the count is low. Slowing of the blood-flow reduces the oxygen supply to the endothelium of the blood-vessels; and sooner or later there is leakage of fluid into the tissue spaces, with concentration of the blood that is passing along and consequent exacerbation of the sludge effect. The blood-cell aggregates *are* ingested by the phagocytes of the liver and spleen, and experiments in monkeys infested with knowlesi malaria have shown that parasitised cells are also ingested by liver cells that allow normal red cells to pass over them unmolested. The red cells containing malarial parasites have a sticky coating of protein nature, and this may be the stimulus for the phagocytic cells since the cell-clumps of sludged blood have a similar protein coating.

The pathological consequences of sludged blood thus depend on the slowing of the blood-stream in the tissues, the possible plugging of blood-vessels, the formation of cell clumps that may act as emboli, and the rapid phagocytosis of these clumps and their protein coating. KNISELY and his colleagues illustrate the effect of vessel plugging by the case of a young woman referred for "psychological disturbances" who was found to have several permanent plugs in the terminal conjunctival arterioles; fresh small plugs were seen to arrive every now and then, plugging a vessel for a short time and then passing on. The several œdematous patients studied all showed a greatly slowed flow through the conjunctival vessels, with semi-rigid aggregates of red cells, and loss of plasma through the vessel walls could be inferred from the microscopically visible hæmoconcentration. In deeply comatose patients there were "large, pasty, sticky wads moving very slowly through rapidly leaking vessels." In monkeys with experimental malaria the blood is eventually converted into a stiff

1. Knisely, M. H., Bloch, E. H., Eliot, T. S., Warner, L. *Science*, 1947, **106**, 431.

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homogeneous sludge rigid enough to resist passage through the peripheral vascular bed; then the animal dies in a few hours. The excessive phagocytosis of cell clumps in liver and spleen suggests that in some "blood diseases" with enlargement of the spleen the persistent anæmia may be partly due to loss of red cells caused by slowing of the blood-stream, aggregation, and then phagocytosis. Most of the diseases in which KNISELY and his colleagues have observed sludged blood in the conjunctival vessels are infective or traumatic states, but malignant hypertension, some affections of the central nervous system, and some neoplasms are also mentioned; the inclusion in their list of hysteria and acute alcoholism is surprising, but the detection of the change in normal uncomplicated pregnancy might have been expected. The list may well grow, for every severely ill patient examined is said to have shown intravascular aggregations and leaking blood-vessels. The Chicago workers do not contend that all the clinical features of these miscellaneous diseases are due to the sludged blood; those that have in the past been vaguely attributed to emboli are the most likely to be direct effects. They suggest that the presence of sludges may be responsible for some of the symptoms of ageing and some of the effects of shock. It has still to be found out how to prevent sludges from forming—how to keep blood-cells unaggregated and blood-vessels intact. "The sludges," says Professor KNISELY, "are now ready for study by all the intensive investigative methods our age affords." Let us hope that he will devise a simple method whereby the necessary observations can be made in the ward.

Agene and Canine Hysteria

THERE are two main reasons why the researches into canine hysteria are of interest to doctors. They have revealed a factor in the staple human diet which in some animals has deleterious effects on the nervous system and the gastro-intestinal tract; and they suggest a further approach to the study of epilepsy and abnormal behaviour in man.

Canine hysteria, a condition of hyperirritability and increased motor activity with major epileptic fits, can be produced by feeding dogs on a nutritionally adequate diet containing a high proportion of white flour "improved" with nitrogen trichloride—the agene process. On another page Mr. HERBERT PARRY, who has taken part in much of the work done on this subject in the United States, reviews the history of the condition and our knowledge of it up to the publication of the latest American reports. Those who have seen Sir EDWARD MELLANBY's cinema film of affected dogs will confirm PARRY's description of the animals' hyperkinetic behaviour, the effect of frustration, fear, or surprise on them, and the convulsions which they ultimately develop. The disorder was recognised in dogs in the last century but it was not till ten years ago that MELNICK and COWGILL[1] produced the syndrome by feeding dogs on a diet with a high gliadin content. In 1946 MELLANBY[2] demonstrated clearly that the syndrome is directly related to an effect which the agene process has on wheat flour, and later MORAN[3] showed that the harmful action is on the wheat gluten. The nitrogen trichloride alone, or the ordinary unagenised gluten alone, does not produce the symptoms. The toxicity seems to arise from changes in the protein molecule.

These observations have lately been confirmed and extended by two large teams in the U.S.A.[4 5] No difficulty was experienced in producing clinical epilepsy in dogs, with electroencephalographic patterns indistinguishable from those seen in human epilepsy, by including 75% of agenised flour in their diet. Convulsive seizures and ataxia could similarly be produced in cats, while monkeys developed weakness and tremors; rats, chicks, and guineapigs, on the other hand, seemed unaffected. Fortunately man is not nearly so sensitive as the dog to the responsible factor, and indeed no other animal has so far been found to be so readily affected. Furthermore, the proportion of agenised flour to the total diet required to produce the dramatic symptoms in dogs is much greater than that normally consumed by man, or indeed by most dogs. Dog biscuits are made from mixed batches of spoiled flour allotted to the manufacturers by the Ministry of Food; so their content of agenised flour varies widely, and since the susceptibility of dogs also varies the incidence of hysteria from this cause (for there are many others) is hard to estimate. The main point which is worrying those responsible for our foodstuffs is not whether agenised white flour is giving rise in man to toxic symptoms of the severe kind seen in dogs—obviously it is not—but whether it may cause mild and unsuspected effects. For instance, may some of the symptoms of the neuroses, or the epileptic fits seen in everyday practice, or even disorders of other systems such as peptic ulceration be maintained or aggravated by such a toxic agent? ELVEHJEM and his team of workers[4] have failed to demonstrate any symptoms or signs of disorder in the nervous system of five healthy children, aged 6 to 16 years, whose daily diets included 70–105 g. of wheat products treated with 3–20 g. of nitrogen trichloride per hundredweight—more than enough to cause severe symptoms in dogs. Moreover, electroencephalograms recorded at three-day intervals during the two to four weeks of administration did not show any changes. The susceptibility of man may well vary at least as widely as that of dogs, and toxic effects in man may take months or years to develop; so observations on a few children over a few weeks, though interesting, are only slightly reassuring.

It was pointed out in these columns last August[6] that as we have been eating agenised flour for a quarter of a century with apparent impunity there may be no need for precipitate action against its use. But there is an obvious need for active research in medical and industrial laboratories and for field experiments. The purpose of agenising, as its name suggests, is to age or mature flour artificially, so improving its baking qualities. In the U.S.A. the food and nutrition board of the National Research Council, in an open letter to the Commissioner of

1. Melnick, D., Cowgill, G. R. *J. Nutrit.* 1937, **13**, 401.
2. Mellanby, E. *Brit. med. J.* 1946, ii, 885.
3. Moran, T. *Lancet*, 1947, ii, 289.
4. Newell, G. W., Erickson, T. C., Gilson, W. E., Gershoff, S. N., Elvehjem, C. A. *J. Amer. med. Ass.* 1947, **135**, 760.
5. Silver, M. L., Johnson, R. E., Kark, R. M., Klein, J. R., Monahan, E. P., Zevin, S. S. *Ibid*, p. 757.
6. *Lancet*, 1947, ii, 284.

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Food and Drugs,[7] has recommended the thorough exploration of alternatives to the agene process, especially treatment with chlorine and chlorine dioxide, to make certain that they also do not render flour toxic. That done they call for the development of safe alternative processes so that mills may adopt them as soon as possible. Meanwhile they would restrict the use of agene to flours which definitely require it, and would reduce the amount of agene used in milling to the minimum needed to produce a satisfactory baking flour. The board fear that more drastic and immediate restrictions might reduce output, raise costs, and lead to waste of flour from spoilage in bakeries. These considerations no doubt apply equally in this country, but it is to be hoped that they will not be made an excuse for shelving the subject. It will be difficult to prove that the toxic substances produced by the agene process are indeed harmless to man, and if a safe alternative can be found the most satisfactory measure will surely be to scrap the agene process altogether.

Censorship of Medical Articles

FREEDOM to publish is one of the precious rights of every British citizen, and doctors value and use it as much as any other section of the people. In a letter this week Dr. R. R. WILLCOX describes the frustrating influence of censorship as experienced by a temporary member of the Services and insists that there shall be "no smell or fraction of censorship for any reason, by anybody other than the editor of a journal . . . in the New Order that is upon us." Clearly this is a vital matter about which the medical profession must have and express clear views. Therefore it is worth making a critical examination of the rules and customs of medical censorship as it is or may be practised in this country.

In our view the Services present a special case. Their function demands an authoritarian structure, and this must be accepted by all who are called on or choose to accept the military way of life, whether as doctors or in any other capacity. Unless the authority of commanding officers is upheld, the discipline and efficiency of a fighting force is not secure, and on this ground alone the Armed Forces cannot allow doctors or any of their members to publish articles that might reflect unfavourably upon the Service. Moreover, the security of military information may very easily be broken by some thoughtless disclosure. While accepting military censorship of medical articles for these reasons, we think that the present system described by Dr. WILLCOX needs modification, because no real purpose is served by passing an article first up and then down the entire chain of command. As a matter of courtesy as well as of discipline an article ought to be shown to the writer's commanding officer, even if this causes some embarrassment to diffident authors; but surely it might then go straight to the Service Ministry concerned and from there to the editor indicated by the writer. There are good reasons why the Services should appoint a medical publications officer whose duties would include not only censoring articles but spreading the lessons they contain by annotations such as were published as semi-official bulletins for medical officers during the war. Such an officer would be well placed for editing the new editions required for the medical manuals published by the Services, and would also be in an excellent position to give help to authors in need of it. If censorship were thus made to serve a medical as well as a military purpose we feel that objections to it by serving medical officers would disappear.

In civilian life the position is entirely different. Every doctor is entitled to his full rights as a free citizen, and any attempt to reduce them must be resisted if the profession is to retain its position. In claiming and exercising such rights, however, doctors incur the corresponding duties of courtesy, loyalty, and responsibility, to fail in which would be every bit as dangerous to the standing of the profession. The right line was taken by the London County Council when it abolished censorship of professional articles and relied on the discretion and loyalty of its officers not to publish in their official capacity anything likely to implicate or embarrass the council in regard to its policy.[1] In the departments of medical schools, universities, and research institutes—places notable for the freedom they allow—it is the custom for junior workers to show their papers to their seniors before publication, not only to receive professional and editorial assistance but also to maintain the team relationship. This obligation, usually unwritten, is not regarded as interference with scientific freedom but as a proper and necessary act of consideration towards colleagues.

In the National Health Service nothing resembling military censorship could be tolerated. Doctors must be allowed full freedom to record their work and if necessary to criticise the service, even as university teachers may attack the curriculum or complain that they have not enough time for research, and the only restraints should be those that are self-imposed. If a doctor is guilty of using his freedom to make unfounded allegations he may be called on to apologise and make suitable amends to those he wrongs. Adoption of this principle may mean a new outlook in the world of officialdom, but since Ministries and councils are spreading so far into the national life they must learn to adapt themselves to the untidy realities of controversy, which is a normal ingredient of vitality. The proper treatment of ill-founded allegation is well-founded retort—not official censorship. For the certain consequence of censorship is a deadly mixture of stagnation in the many, revolt in the few, and frustration in all.

Supplies of Vitamin A

SOME preparations containing vitamins A and D are now obtainable on prescription only. This measure has been adopted by the manufacturers to conserve supplies of vitamin A. Natural vitamin D can be supplemented by the synthetic product and is therefore plentiful, but vitamin A is at present wholly made from fish-liver oils. The work done on the synthesis of vitamin A in England, Holland, and Switzerland, discussed this week in our correspondence columns, may lead before long to production of the synthetic vitamin on a commercial scale.

7. *J. Amer. med. Ass.* 1947, 135, 769.

1. *Lancet*, 1943, ii, 168.

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Annotations

PLANNING THE HOSPITAL

ARCHITECTURE, like medicine, is never static. Ecclesiastical and domestic architecture sometimes revert to earlier fashions; but in designing hospitals the movement is almost always forwards, for better or worse. This movement has been particularly rapid during the present century, when new materials have helped the designer to cope with new demands arising from new techniques. Plainly, the hospital architect must be a man of vision: he must satisfy those who work in his hospital and those who are received in it as patients; he must take full account of local needs and tastes; and, with the help of advisers, he must provide as best he can for future changes, and particularly for expansion. On another page Jean Walter, of Paris, urges, with some reason, that the planning of hospitals should be entrusted to those who have travelled and studied other hospital buildings at home and abroad, while the architect's staff should be built up of subordinates, each specialising in one small division of this large field. Britain shows many an all-too-permanent example of faulty earlier hospital design, and if Walter's proposal did no more than ensure that earlier mistakes were uncovered and shunned it would deserve attention. On the medical side, most doctors have a clear idea of the form their own departments should take, but comparatively few have imagined these departments in perspective with the rest of the institution. We hope that Monsieur Walter's article, and those that follow, will encourage realistic imagination.

THE VIRUS AND THE CELL

MANY of the most fruitful discoveries in the virus field derive from Hirst's observation[1] that influenza viruses are adsorbed to and agglutinate the red blood-cells of fowls, human beings, and other species. Hirst's hæmagglutinin test and its modifications make it possible to estimate influenza viruses and their antisera quantitatively with a speed and accuracy which were unattainable when the mouse-neutralisation test was the only tool. Later work has shown that the viruses of mumps, fowl plague, and Newcastle disease of fowls agglutinate red cells in a similar way. Not only is the test convenient for rapid diagnosis but it also provides a means of obtaining insight into the reaction between a virus and the cell it attacks.

In this issue Dr. F. M. Burnet summarises the work in this field he and his collaborators in Melbourne have done in the last two years. They followed up work of Hirst's[2] which suggested that influenza virus had an enzyme-like action on cells: after adsorption on red cells, it is after a time spontaneously eluted, leaving the surface of the cells altered in several ways and unable to react again with more of the same kind of virus. The eluted virus, on the contrary, is unaltered and can produce similar effects on more and more cells. An interesting chain of evidence led to Burnet's discovery that a potent enzyme could be obtained from cultures of *Vibrio choleræ* having a similar action to that of the virus in altering the surfaces of the red cells. The probability was that specific receptors on the red-cell surface were concerned, and the cholera enzyme was therefore named "receptor-destroying enzyme," or RDE for short. Earlier work, again by Hirst,[3] had made it likely that the readily observable virus-red-cell reaction was giving a broad hint as to what was actually going on behind the scenes between virus and the susceptible cells of the respiratory epithelium. Work by two of Burnet's colleagues has carried this subject further—first in experiments in the lungs of freshly killed mice, then in the allantoic cavities of chick embryos. In both situations the adsorption, and in certain circumstances elution, of virus occurs as on the red-cell surface. In both, the adsorption of virus is prevented by previous treatment of the susceptible tissues with cholera RDE. Here we have a treatment which renders cells resistant to the virus attack. "These findings," says Burnet, "appear to open up a number of possibilities of high potential importance, notably a logical approach to virus chemotherapy."

The next step was to determine the chemical nature of the substrate on which virus and RDE acted—a difficult task where complex things like living cells are concerned. Fortunately some work of Francis[4] on virus-inhibitors in normal serum led to the finding that something in serum could act as substrate for RDE. Nor was it long before evidence was at hand that that something was a mucin. A known mucin—that carrying the A, B, or O blood-group specificity—is present on human red cells, and there is presumably something similar on the surface of respiratory-tract cells. Burnet puts forward a plausible case for believing that influenza viruses make their primary contact with specific mucins on the cell-surface, their enzyme action on such cells being a necessary preliminary to infection. One cannot, of course, assume that all cells carrying a suitable mucin can be infected and support multiplication of the virus: red blood-cells demonstrably cannot do so. It is perhaps rather premature to follow Burnet's speculation that other specific chemical receptors may occur on the surfaces of other cells, attacked by other viruses. Intriguing as these possibilities are, there is much to tidy up before Burnet's thesis can be accepted as gospel. Recent work by Friedewald et al.[5] does not wholly agree with Burnet's as to a possible place of the A, B, O group substances in the picture. Moreover, Green and Woolley[6] have demonstrated inhibition of influenza virus, rather similar to that by animal mucins, in the presence of various complex carbohydrates, especially apple pectin. This can hardly be claimed to afford a rational clue to the cell-virus relationship, even though it may lead to an explanation of why an apple a day keeps the doctor away!

We must all hope that Burnet is right in his belief that this work will lead towards the elusive goal of successful virus chemotherapy. We confess, however, to rather less optimism than his. The agents which he has in mind presumably act at the cell-surface, not within the cell; and we have already, in immune sera, substances which are very potent against extracellular virus but are, to say the least, therapeutically disappointing. Burnet's survey will certainly be a stimulus to new work along novel and fundamental lines and will make it abundantly clear why the Royal Society lately chose him as the recipient of their Royal medal.

QUESTIONS IN PARLIAMENT

ONE of the problems which the nationalisation of an industry poses is adequate representation of the consumers' interests. When our hospital service is nationalised the patients will be the consumers of medical care, and the question arises how far the Minister of Health can be expected to answer questions asked on their behalf in Parliament. Questions about the treatment of patients in the hospitals of the Services and of the Ministry of Pensions can be addressed to the appropriate Minister. But during the war the hospitals in the Emergency Medical Service did not come within the same category, with the few exceptions administered directly by committees appointed by the Minister. After the appointed day the hospitals of this country will

1. Hirst, G. K. *Science*, 1941, **94**, 22.
2. Hirst, G. K. *J. exp. Med.* 1942, **76**, 195.
3. Hirst, G. K. *Ibid*, 1943, **87**, 99.
4. Francis, T. jun. *Ibid*, 1947, **85**, 1.
5. Friedewald, W. F., Miller, E. S., Whatley, L. R. *Ibid*, 1947, **86**, 65.
6. Green, R. H., Woolley, D. W. *Ibid*, p. 55.

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become the property of the State, but the intention is that the regional boards and the teaching hospitals' committees shall have the legal liability for the welfare of the patients and not the Minister. Can he therefore be expected to answer questions in the House about them? This is not an academic question, for the way in which it is answered is crucial in the constitutional control of public-service corporations. In a letter to the *Times* of Dec. 10, Mr. I. J. Pitman, M.P., asked: "Is it not clear that, so long as the nation through Parliament owns the property and even more particularly so long as the Minister has 'powers to direct,' the force of Parliamentary and of public opinion will insist that even the question of a dirty brass button shall be not too small for Parliamentary attention if it can become the occasion of injustice or of other high principle?" On Dec. 11 Mr. Bevan assured Colonel Stoddart-Scott that the Minister of Health will in fact be answerable for the new health services and for their administration by local or regional bodies,[1] adding, however, that he hoped that the proper responsibilities of these bodies would not be diminished by too many inquiries on detailed day-to-day matters unless some point of general importance was involved. As Mr. Pitman pointed out, "questioning of the affairs of the Post Office is not restricted yet is not apparently abused," and this appears to be a proper precedent.

OBSTETRIC SHOCK

THE idea of "shock" seems to have come into its own again in Professor Sheehan's description in this issue of the pre-mortem signs and immediate post-mortem findings in obstetrical fatalities. In at least half the cases hæmorrhage can be ruled out, but in a great many of them the uterus was unable to rid itself of its contents, either baby or placenta. Afferent stimuli from the uterus may therefore have helped to precipitate the circulatory collapse which followed, and Sheehan points out that, though there was no visible blood-loss, many of the signs of shock are consistent with the autonomic reaction to hæmorrhage having taken place. The blood, however, does not seem to be there, and according to Sheehan it is neither circulating nor visibly pooled anywhere. Where is it? He does not exclude general pooling, but this can only mean capillary dilatation, and this seems conspicuously absent from so many parts of the body that one would expect it to be detectable in the others. Hæmatocrit figures are not given, so one cannot judge of the possibility of a good deal of fluid being lost by transudation into the tissues—a possibility of more than usual importance in this type of shock. Albers[2] claims that the high venous pressure which is maintained during the latter part of the second stage of labour is normally responsible for driving a considerable amount of fluid out of the capillaries. Brown and her colleagues[3] in San Francisco, who are interested in the reasons for heart-failure after delivery, have confirmed that over a litre of plasma may disappear from the blood during a normal labour. If labour were unduly prolonged the circulation might become actually depleted in this way, though one would expect the venous pressure to fall with exhaustion and the colloid osmotic pressure of the plasma to oppose the loss of fluid as the blood became concentrated. Sheehan found no gross œdema. Nevertheless, the possibility would be worth investigating, particularly in view of the fact noted by Brown et al. that their patients who received ergot had an unusually high venous pressure for the first 24 hours after delivery; presumably the same effect might be seen during a long labour if patients were receiving oxytocic agents and it would augment the already high venous pressure. The capacity of the circulatory system relative to the volume of blood seems to be crucial; if the subendocardial lesion described by Sheehan had determined any kind of heart-failure one would have expected venous congestion. A primary pressor reaction of the autonomic is equally improbable, since this would lead to a high arterial blood-pressure. Pressor phenomena together with circulatory failure are, on the other hand, easily reconcilable with fluid loss. Unusual difficulties encountered by Brown et al. in securing reliable blood-volume measurements during labour appeared to be due to the existence somewhere of "pockets" of blood partially excluded from the circulation.

Brown and her colleagues came to no definite conclusion regarding the peculiar nature of the strain on the heart during labour, but the tendency of susceptible patients to heart-failure even after cæsarean section is mysterious. They are inclined to attribute it in part to the sudden loading of the circulation consequent on closure of the arteriovenous shunt supposedly represented by the placenta. They point out that whereas during natural labour the circulation may become conditioned to this loading by repeated contraction of the uterus, it may not do so in cæsarean section. It is interesting that attention should be drawn at the same time to two types of postpartum circulatory collapse, neither satisfactorily explained, one apparently due to shortage of intravascular fluid and the other to too much.

THE MASTER HAND

Professor Blau's monograph on lateral dominance[1] has a destructive freshness, stimulating to the reader who has previously taken it for granted that left-handedness is an inherited "constitutional" attribute, that it is manifest from early infancy, that we are doing harm if we try to induce a left-handed child to prefer the use of his right hand, and that stuttering and specific reading disability may be consequences of such retraining or of incomplete dominance. Blau polishes off these notions with detailed argument and blunt denial. Thus:

> "The alleged dangers of retraining are non-existent. This misconception is due to not understanding the emotional background of sinistrality or the psychological and organic physiology and pathology of the brain."

This plain speaking, however, follows an impressive array of observations, and is accompanied by a positive theory, implied in the foregoing passage where it refers to "the emotional background of sinistrality." Blau is convinced that people who would ordinarily become right-handed in the normal way may be deflected into left-handedness by some deficiency (such as a physical defect in the right arm), or faulty education, or—most important of all—emotional contrariness. In a situation that causes conflict, the child is driven to express hostility and resentment by "negativism," which may take the form of left-handedness and kindred anomalies. Consequently he may show in later life, along with his persistent sinistrality, neurotic symptoms left over from these early struggles, or he may have a rebellious, rigid, self-willed, obsessional personality. Stuttering, when it occurs in left-handed people, is another sign of their early neurosis, rather than itself a consequence of their sinistrality. Dr. Blau would make his case for these views much stronger if he gave more information about the number of left-handed people he had himself studied, and the biographical or direct observations which had

1. *Lancet*, 1947, ii, 929.
2. Albers, H. Normale und pathologische Physiologie im Wasserhaushalt der Schwangeren. Zwanglose Abhandlungen auf dem Gebiete der Frauenheilkunde, vol. I, Leipzig, 1939.
3. Brown, E., Sampson, J. J., Wheeler, E. O., Gundelfinger, E. F., Glansiracusa, J. E. *Amer. Heart J.* 1947, **34**, 311.

1. The Master Hand: a Study of the Origin and Meaning of Right- and Left-sidedness and its Relation to Personality and Language. By ABRAM BLAU, M.D., assistant clinical professor of psychiatry, New York University College of Medicine. New York: American Orthopsychiatric Association. 1946. Pp. 206.

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confirmed his opinion. But as it stands, his treatise is an interesting contribution to this theme, more scholarly than Orton's and more provocative than Selzmer's, and important to the child-psychiatrist and educational psychologist because of its practical suggestions for the education of children who prefer to use their left hands.

ALCOHOLICS ANONYMOUS IN LONDON

WE have previously described the work of "Alcoholics Anonymous," [1] the American voluntary association in which those who have been heavy drinkers help others to overcome their addiction. A branch has now been formed in London, and meetings are held weekly in restaurants, or at the homes of one or other of the nine members. The only aim is to help the alcoholic who asks for help; there are no dues to pay, and what few expenses arise are met by voluntary contributions. Growth will depend on attracting those who need this particular type of friendly assistance: no formal plan for promoting the scheme is being adopted, and organisation is being kept as simple as possible. Alcoholics Anonymous wish to work in close cooperation with doctors. Their method is simple, but has proved effective: members are able to gain the confidence of the alcoholic because their own histories prove that they understand his difficulties, and because they offer him companionship. A correspondent defines the movement as "a free association of men and women who have learned how to obtain and maintain sobriety and development of personality, and who spend much time sharing their experience with others." The hon. secretary receives inquiries addressed simply BM/AAL, W.C.1.

COST OF THE NEW ZEALAND HEALTH SERVICE

THE report for 1946–47 of the director-general of health for New Zealand provides a detailed statement of the health budget for the year which enables us to review early conceptions and predictions about the course of the New Zealand health service.

The total cost of the service continues to rise and has now reached the considerable sum of £3 12*s.* 6*d.* per head of population. One of the more rapidly increasing items of expenditure continues to be the pharmaceutical benefit, which now absorbs a sum of nearly £1$^1/_2$ million per annum. This means an expenditure on drugs of 16*s.* 11*d.* per year for every man, woman, and child in New Zealand. The report points out that part of this increased spending is due to the rising costs of drugs, and to the fact that "many expensive new drugs have been introduced during recent years and that, in the absence of health benefits legislation, the majority of them would not have been available to most patients on account of their cost." This is, however, not the whole story, for the actual number of prescriptions each year has increased steadily and is now nearly 5,900,000—a million more than in 1945 and nearly 2,400,000 more than in 1943. The actual cost of the pharmaceutical service is 2$^1/_2$ times what it was in 1943.

The statistics for the services given by general practitioners provide a clearer picture than has sometimes emerged from reports sent from New Zealand or from the tales of returned travellers. New Zealand's present population is 1,705,550. During the year under review claims were made on the social security fund by 1121 general practitioners. On the assumption that this was the total of general practitioners in the Dominion each one was responsible, on average, for 1521 patients. Probably, however, each has slightly less than this number, since some doctors in scattered areas and in the predominately Maori communities are paid by salary; but their number is unlikely to account for an error of more than 2–3% in the calculation. The money paid out on the claims of these 1121 doctors was £1,600,601, providing an average income of £1428 per doctor. It represented an annual payment per patient of 18*s.* 9*d.*—a sum which (when we consider that the New Zealand pound is worth less than the pound sterling) would not be regarded as a very generous per-capita payment in this country. If we can assume that these claims were all charged to the State at the rate of 7*s.* 6*d.* per item of service, this would represent 2$^1/_2$ items of service per patient per year—only half the figure of 5, often quoted in this country as the average number of items of service given to each panel patient. This seems to contradict the oft-told stories of over-visiting by the doctor or of frivolous calls by the patient in New Zealand. Besides these payments for general medical services the medical practitioners share £232,088 paid for maternity work and £95,114 paid for mileage. The addition of these two sums brings the practitioner's average income from State sources up to the total of £1720. There is, however, no way of estimating the extent to which the practitioner may augment this income by private practice or by part-time consultant work in hospitals or clinics. A considerable amount of this work falls to the lot of the general practitioner in New Zealand.

1. *Lancet*, 1947, i, 681.

AMPHIBIOUS VISION

Francis Galton used to amuse himself, more than eighty years ago, by trying to obtain distinct vision under water when diving. In his own words [1]:

> "The convex eyeball stamps a concave lens in the water, whose effect has to be neutralised by a convex lens. This has to be very 'strong,' because the refractive power of a lens is greatly diminished by immersion in water. My first experiment was in a bath, using the two objectives of my opera-glass in combination, and with some success. I then had spectacles made for me, which I described at the British Association in 1865. With these I could read the print of a newspaper perfectly under water, when it was held at the exact distance of clear vision, but the range of clear vision was small."

The importance of equal vision in air and in water for whales is obvious, and such vision is made possible to them by peculiar modifications described by Mann.[2] To counteract underwater pressure at great depths, the eye is small, exposing a minimal surface, the sclera is extraordinarily thick, the cornea is flattened and has a thick edge, the corneo-scleral junction is bevelled, and the eyeballs are immovable. The eye is further divided into an upper part with a long axis for vision in water, and a lower part with a short axis for vision in air. Owing to the scanty illumination of objects under water, various ingenious adaptations, including a perilenticular space, a spherical crystalline, a very forward position of the lens, and a remarkably retractile iris, make use of all the available light. Undulations in the retina enable many more receptors to occupy a small area, so that the movements of objects under water can be better seen. Mann has discovered retinal cones in the cachalot (*Physeter macrocephalus*) and the finback (*Balænoptera physalus*), which fact suggests that whales, contrary to accepted opinion, can see colours.

1. Galton, F. Memories of My Life, London, 1908, p. 186.
2. Mann, G. *Biologica, Santiago*, 1946, p. 23.

RELEASE OF DOCTORS FROM SERVICES

THE Central Medical War Committee has been notified of the following arrangements for the release in class A of medical officers during the first quarter of the year:

Royal Navy.—January, group 66; February, groups 67 and 68; March, groups 69, 70, 71, 72, and 73.

Army.—General-duty officers: January, group 64; February, group 65; March, group 66. *Physicians, surgeons, and gynæcologists:* January, group 59; February, group 60; March, group 61. *Other specialists:* January, group 57; February, group 58; March, group 59.

Royal Air Force.—January, groups 65, 66, and 67; February, no release; March, group 68.

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Special Articles

CANINE HYSTERIA AND WHEAT

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MUCH evidence had accumulated over the past two decades (Arnold and Elvehjem 1939) that wheat products in the diet were important in the pathogenesis of canine hysteria, but it was not until 1940, as a result of critical studies in which rigorous precautions were taken to exclude possible ætiological agents other than the food, that the dietary basis of one type of the disorder was established unequivocally (Parry 1940). By the use of diets of highly purified constituents, supplemented by vitamins and complete both quantitatively and qualitatively in all nutritional factors known to be necessary for the dog, it was found that the motor episodes of hysteria could be produced within forty-eight hours if wheat gluten was the sole source of protein. That wheat gluten was the effective hysteriagenic agent was confirmed by Wagner and Elvehjem (1944). These investigations were interrupted by the war, but it was hoped to repeat and extend them before publication. However, the recent work of Mellanby (1946, 1947) and of Moran (1947) on the effect of agenising wheat flour has thrown new light on the rôle played by wheat proteins in the ætiology of canine hysteria.

SYNDROME OF CANINE HYSTERIA

Canine hysteria is no new disease. Elizabeth Barrett Browning gave an excellent description of it in her dog "Flush" in 1847 (Huxley 1931). It was at that time usually described as epilepsy (Moore 1863, Hill 1878), but severe epidemics of the disorder in France were attributed to auricular acariasis (Nocard 1882). There seems little doubt that many cases were confused with and diagnosed as rabies (Gray 1915), and it was not until rabies became uncommon in Britain after 1900 that the true incidence of canine hysteria was appreciated.

The term hysteria seems to have been applied to the disease about 1890 (Hill 1892), and since 1920 it has been widely recognised under this name in the British Isles. Canine hysteria has been virtually unknown in France apart from a few short epidemics, whereas in Holland it has been prevalent since the mid-1920's; in Germany it is apparently unknown. In the United States, where it is known as "fright disease," it is widespread and has been recognised since the beginning of the century. In Australia a few cases have been recognised recently.

Much of the confusion in writings on this subject has arisen from the difficulties of diagnosis. Canine hysteria is but one of several syndromes in which epileptic seizures, running barking episodes, and anxiety states are prominent features. Some of these syndromes are undoubtedly due to neurotropic viruses which produce morphological changes in the central nervous system, though the clinical signs may be transient and the dogs may seem to recover. Other cases show no such morphological changes. Some are idiopathic grand-mal epilepsy. Many others are associated clinically with alimentary helminthiasis, constipation, ectoparasitic infestation of the external auditory meatus, &c. Many cases develop spontaneously without obvious cause in young dogs aged 4–6 months; these cases coincide with the eruption of the permanent teeth and are usually attributed to teething. Suckling bitches often show the disorder, which disappears spontaneously after weaning. Finally, there is the large group of cases, in dogs of all ages, in which the diet is considered to be the essential ætiological factor, though unusual stimuli, such as loud and sudden noises or strong emotional excitement, will produce episodes in apparently healthy animals. The dietary constituent usually implicated is baked dog-biscuit containing wheat products, but there are many well-authenticated cases in which the diet has contained no cereals.

We are thus faced with the situation that the syndrome termed canine hysteria, fright disease, or running fits, is a symptom-complex elicited by a wide variety of ætiological agents. Even if the term canine hysteria is confined to those cases definitely not due to infective or parasitic causes, we must recognise that the dietary form can be due to dietary factors other than wheat and wheat products, or proteins treated by the agene process, and that the clinical signs may be elicited by external stimuli, especially auditory and visual ones. It is thus essential, in experimental studies on canine hysteria, to exclude factors other than those under specific consideration, since the differentiation of ætiological types on the basis of clinical signs is very difficult, even for those with wide experience of canine neurology.

CLINICAL SIGNS OF DIETARY CANINE HYSTERIA

The principal clinical feature of the syndrome[1] is the violent episodes of motor activity, combined with disturbances of consciousness. These may be simple running seizures in which the animal runs about violently as in flight, often colliding with objects, probably from faulty judgment rather than failure to see them. The animal is not fully cognisant of its surroundings and apparently has no recollection afterwards of events during the seizures, in which it may travel many miles. There is a tendency to be aggressive, even towards well-known human friends, if the dogs are approached roughly, but the aggressive attitude is one of defence rather than of attack, and it is remarkable how in many cases a seizure can be cut short by sympathetic human handling. The dog sometimes barks in an unusual high-pitched manner during the running seizures, and such barking may occur without running attacks. These constitute the familiar running barking fits and may last from a minute up to several hours. In addition generalised grand-mal epileptiform convulsions occur with tonic and clonic phases and complete loss of consciousness and of motor control of sphincters; these last 30–60 seconds and often leave the dog exhausted. Both types of motor episodes may occur together, one following the other closely; the epileptiform convulsion usually precedes the running seizures, but on several occasions the convulsion has immediately followed a running seizure.

Before the acute motor episodes the dog often exhibits well-marked anxiety and apprehension, which may persist for days and weeks, without any motor episodes being observed or suspected. This prodromal anxiety is by no means constant, and its intensity is not a reliable guide to the onset of motor episodes. Often motor episodes will develop in a dog showing no clinical signs of this prodromal anxiety; in other instances, sometimes in the same dog, mounting apprehension heralds a motor episode.

After a motor episode a dog may appear almost normal at once, with apparent dissolution of the prodromal anxiety state; on other occasions the anxiety is enhanced; in others again a short period of automatic behaviour develops which may easily be overlooked or be confused with the signs of prodromal anxiety, and after protracted and frequent motor episodes various degrees of exhaustion, coma, and ataxia occur. In a small proportion of cases residual neurological defects are found, especially impairment of vision. However, in general the disorder is

1. A full account, based on the personal observation of nearly 200 seizures, is in preparation (Parry 1948a).

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completely reversible, leaving the dog with no permanent ill effects and without any change in its inherent susceptibility to further attacks.

HYSTERIA-PRODUCING DIETS

Most of the studies on canine hysteria have used diets of mixed constituents, with which it has been impossible to obtain accurate data about the precise nature or amounts of the various nutritional elements consumed. Since various workers have from time to time suggested that nutritional deficiencies of vitamin A, thiamine, lysine, or protein might be involved, an accurate assessment of these factors was highly desirable. In addition there were hints from clinical experience that the salt intake and the proportion of calories derived from fat might be important contributory factors.

To ensure control of all these variables it was necessary to devise diets of purified constituents. This was done, and the purified diets containing wheat gluten, which we found to be hysteriagenic, were developed from the gliadin diets of Melnick and Cowgill (1937), which were found to have only limited hysteriagenic potency. These results have been reported briefly by Wagner and Elvehjem (1944). A detailed account will be published shortly (Parry 1948b), so only the salient points need be mentioned here.

The basic ration comprised commercial wheat gluten (which subsequent inquiry showed to have been prepared from wheat flour treated by the agene process) 487 parts, sucrose 633 parts, lard 377 parts, bone ash 40 parts, Wesson's salt mixture 30 parts, and liver extract 2% (by weight). To this was added once weekly, immediately before feeding, 10 mg. of α-tocopherol as the acetate dissolved in ethanol; 2 ml. of cod-liver oil, containing 1500 *U.S.P.* units of vitamin A and 100 *U.S.P.* units of vitamin D, was given by pipette daily. Thiamine and pyridoxine hydrochlorides were given twice a week in a similar manner at the rate of 160 μg. of thiamine base per 100 g. of food consumed and 100 μg. of pyridoxine base per kg. of body-weight per day. Precise daily records of individual food consumption and of body-weight were kept.

Sixteen dogs were used and motor episodes were observed in as short a period as forty-eight hours from the time of feeding, the number of episodes observed ranging from 1 or 2 to sometimes 10 or more a day. It was found repeatedly that the time of onset (i.e., the interval from the feeding of the hysteriagenic diet to the first motor episode), the number of episodes observed per day, and their severity were directly proportional to the amount of wheat gluten consumed. It was possible for animals on a modest intake to subsist on this diet indefinitely without showing any signs of anxiety or motor episodes; to all intents and purposes they were perfectly normal. With slightly higher intakes they might have occasional motor episodes, especially if hysteria-precipitating factors were present. Finally, with high intakes large numbers of spontaneous episodes occurred.

These studies and those of Wagner and Elvehjem (1944) established that the cause of the experimental disease was not a deficiency of any nutritional factor at present known to be necessary for the normal nutrition of the dog but almost certainly a toxic substance present in certain samples of wheat and wheat flour. The toxic factor was present in wheat gluten and in some samples of gliadin. There was a maximum tolerated daily dose of the toxic agent which could be consumed by dogs indefinitely with impunity, and ingestion had to exceed this level before signs of hysteria appeared. This quantitative relationship means that any studies purporting to show hysteriagenic activity in one foodstuff and not in another, or to establish the efficacy of some treatment, can be misleading unless the level of consumption of the foodstuffs under investigation is the same in terms of g. of foodstuff per kg. of body-weight per day in all the animals on the experiment, and the level of intake is sufficiently high to ensure a fair chance of exceeding the maximum tolerated daily dose. Few studies contain sufficient data to make it clear whether these essential requirements have been met.

PRECIPITATING FACTORS

The most characteristic clinical feature of the syndrome is the motor episodes, and it is on their occurrence that any assay of suspected foodstuffs must for the present be based. The signs of prodromal anxiety and of the recovery state are not sufficiently clear-cut or pathognomonic to serve as a satisfactory indication of the presence of hysteria, and studies based on these signs are of little value.

The frequency and duration of the motor episodes are determined by several factors, only one of which is the primary hysteriagenic agent—e.g., the wheat constituent in the diet—and many of which are not yet clearly defined. If a dog is brought into a state of hysteria-proneness, which may or may not be associated with clinical signs of anxiety, by feeding a suitable amount of a primary hysteriagenic foodstuff, motor episodes may be precipitated by various means. If the intake of the primary hysteriagenic agent is sufficiently high, episodes will occur spontaneously, their frequency, intensity, and duration being roughly proportional to the quantity of the agent ingested. At lower intake levels no motor episodes may occur unless one or more additional precipitating factors are present. These precipitating factors, which possess no primary hysteriagenic action of their own, may be neuropsychological, dietetic, or metabolic, and we have considerable evidence that they can be very important in modifying the occurrence and severity of the motor episodes in the experimental disease produced by wheat products.

Neuropsychological hysteria-precipitating factors are in the main exteroceptive stimuli mediated by auditory and visual receptors, though tactile ones may play a rôle. It is well known from clinical experience that a loud or sudden noise, such as the back-firing of a car engine, or an apparently harmless situation which has acquired an emotional association for the dog, such as the scene of a previous fight or an unexpected rebuff from a human friend, may precipitate episodes. That such factors will precipitate episodes in experimental hysteria we have had repeated experience, and even the illumination of the room can be the critical factor.

The dietetic and metabolic hysteria-precipitating factors are not so well recognised. We have had several instances in which a simple change in diet from one with low primary hysteriagenic activity to one devoid of any such property—e.g., a pure carbohydrate diet—has been followed by severe motor episodes lasting several days until they gradually disappeared, though the consumption of the carbohydrate diet was being continued. From our own data and that of Wagner and Elvehjem (1944) it is clear that no nutritional deficiency of an accessory food factor in the usually accepted sense is involved, but we have data which strongly suggest that the saturation of the body with certain members of the vitamin-B complex plays an important rôle in the production of the motor manifestations. The other metabolic factors are concerned principally with water and electrolyte balance, and Allen (1945) has claimed that he can precipitate episodes by administering large quantities of water by stomach-tube to apparently normal dogs, which were presumably in a state of symptomless hysteria-proneness.

It is clear, then, that tests intended to compare the hysteriagenic potency of two foodstuffs may produce misleading results unless adequate steps are taken to

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ensure that these hysteria-precipitating factors are identical for the two groups of animals.

DISCUSSION

The experimental production by dietary means of a severe epileptic psychomotor anxiety state in forty-eight hours is of considerable interest. We can say with some confidence that this syndrome can be due to dietary causes alone, and that the cardinal factor is the ingestion of a primary hysteriagenic agent associated with the protein moiety of certain foodstuffs, notably wheat. The hysteriagenic action of the wheat is almost certainly due to a positive noxious chemical agent, soluble in 70% ethanol and present in the gliadin fraction, not soluble in the usual fat solvents, stable to baking at 400°F for one or two hours, and maintaining its activity in dog-biscuits for years when stored at room temperature.

When ingested in adequate amounts the hysteriagenic agent has a well-marked pharmacological action in the dog, but apparently a much weaker one, or none, in other kinds of animals. This action is principally on the central nervous system, where the agent may initiate the syndrome or possibly merely set off an underlying hysterical tendency, to which the dog may prove to be particularly disposed. That the mode of action of the hysteriagenic agent is possibly not dissimilar from that of other epileptogenic agents in the dog is suggested by the importance of hysteria-precipitating factors of a neuropsychological and metabolic nature and is supported by the recent electroencephalographic data showing coexisting cerebral dysrhythmia (Newell et al. 1947). However, it seems certain that the pharmacological action of the hysteriagenic agent, in its quantitative aspects at least, can be modified considerably by the general pattern of body metabolism.

The precise nature of the hysteriagenic agent must await new data, but the hypothesis which accords best with all the information is that we have a specific hysteriagenic agent which is not a deficiency of the protein or of any protein constituents or of any other known nutrient. Our dogs were in nitrogenous equilibrium, and the production of an amino-acid deficiency in forty-eight hours seems highly unlikely. In view of the analogies drawn between these studies and the use of glutamic acid in petit mal in man it is worth mentioning that both Melnick and Cowgill (1937) and ourselves have produced the syndrome on diets containing about 20% of gliadin, two-fifths of which is glutamic acid.

The qualitative studies of Mellanby (1946, 1947) and Moran (1947) have shown the important connexion between the agene process and hysteriagenic potency. It is not clear from this work, however, whether the agene process initiates or merely enhances the hysteriagenic activity of wheat flour. The general conditions of their experiments and the use of a cooked dietary of several natural foodstuffs do not permit any close assessment of the rôle played by hysteria-precipitating factors, environmental or metabolic, which can greatly modify the pharmacological response of a dog to a primary hysteriagenic agent. Nor is it certain that in all their cases the experimental dietary disorder was uncomplicated by naturally occurring and spontaneous disease. The quantitative appraisal of these interesting observations under more rigorous experimental conditions seems desirable.

SUMMARY

The syndrome of epileptic convulsions, motor seizures, and anxiety is but one of a group of epileptic psychomotor anxiety states commonly seen in the dog, and is associated with a wide variety of ætiological factors. These ætiological types may be extremely difficult to distinguish on clinical data alone.

An acute reversible type of a purely functional nature, now usually called canine hysteria, has been known for at least a century and is due to the ingestion of hysteriagenic diets. One dietary form can be produced experimentally by the ingestion of wheat gliadin, gluten, or flour, especially wheat flour treated by the agene process.

The primary hysteriagenic factor is almost certainly a positive noxious chemical agent which is produced or whose action is enhanced, by agenising the wheat flour.

The onset of acute motor episodes is only in part determined by the ingestion of the primary hysteriagenic food. Neuropsychological, dietetic, and metabolic factors, in themselves without primary hysteriagenic potency, can be important hysteria-precipitating agents.

In experimental studies on functional nervous disorders in the dog it is desirable to bear in mind the numerous virus, parasitic, and spontaneous disorders which may give rise to similar symptoms.

The experimental observations on which this paper is based were carried out at the University of Wisconsin during the tenure of a Commonwealth Fund Fellowship, 1938–40.

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MINISTER AND PROFESSION

THE B.M.A. STATEMENT

ON Dec. 18 the council of the British Medical Association issued the following statement:

The Negotiating Committee has now completed the work of presenting to the Minister of Health the views of the medical profession on the National Health Service Act, 1946. The Minister of Health has replied to the views of the Negotiating Committee. Every doctor should study carefully both documents, since, as the Minister himself has said:

> "Every dootor will have to decide for himself when the proper time comes whether or not he should take part in the new service and the profession as a whole will be free to determine their views on the service when they know what it is to be."

It is now the profession's duty to decide its collective attitude to the Act prior to the making of individual decisions by those doctors affected.

In his reply the Minister acknowledges that the medical profession has worked untiringly for a comprehensive health service to be available to all who need it. The medical profession itself has helped to formulate the plan, a contribution which has too often been ignored by opponents of the profession. The profession objects, not to the aim itself, but to the methods proposed, under the present Minister, to achieve it. It would be useless to disguise that on this subject the differences between the Minister and the profession are deep. On no single major issue has the Minister responded to the reasoned arguments of the profession.

SALARIED EMPLOYEES

Family doctors entering the service will be the salaried employees of the State. There is no escaping this

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conclusion. That the public may not draw from this the deductions which are obvious to most medical men is the tragedy of the present situation. A man can be genuinely responsible only to one master. Until now, that master, for the medical profession, has been its patients, to serve whom is its vocation. The need for single-minded devotion of the doctor to those under his care has been for centuries the first lesson to be taught to the young medical student by his teacher. Like other men, the doctor must gain a livelihood. For that livelihood, he has been dependent until now on his own skill and his patients' recognition of this. Henceforward, for those entering the service, there will be new loyalties and different paymasters—the all-powerful State, whose purposes are not necessarily those of medicine. Today, a doctor's advice is given without fear or favour, and is accepted—within the limits of ordinary human fallibility—as having but one sole object: to help his patient. Tomorrow, when the doctor's attention—and loyalty—are divided between his patient and his paymasters in Whitehall (controlled as these in turn will be by extraneous considerations of national finance and other non-medical considerations), who knows what conflicts of duty and interest may not occur?

These are not imaginary bogies, conjured up by an alleged "reactionary" profession to impede the progress of "a great social reform." When the Negotiating Committee asked for the abolition of the "basic salary" idea it well knew what it was about.

It is significant that the Minister puts forward no arguments in favour of a universal basic salary. He stated in his letter of Jan. 6, 1947, that the question was still open and that he wished to discuss it with the profession. No such discussion has taken place. Now his arbitrary decision is that every general practitioner must be a salaried officer. The only argument ever used by a member of the Government in support of a universal basic salary is the one used by the Lord Chancellor in the House of Lords when he argued that the salary method was needed for the control of certification. If this is so, the public is vitally concerned. Public safety demands that the individual doctor shall be free to certify what he finds in his patient without fear of Government influence. At the outset the State salary is to be £300 a year. But this figure can be varied by the present Minister or a successor upwards or downwards by simple regulation and at any time he chooses.

A further safeguard on the independence of medicine disappears with the abolition of goodwill in public general practice. Nor will any practitioner be able to enter public practice without the ultimate approval of a committee in Whitehall. Do these changes taken together mean that the medical profession must ultimately become the full-time salaried servants of the State? Can they mean anything else? Were they ever intended to mean anything else—bearing in mind the published policy of the party in power?

PARTNERSHIPS, PAY-BEDS, REMUNERATION, AND RIGHT OF APPEAL

This is the central issue and it is an issue of principle. But since the Act affects every doctor, every doctor will look closely at the terms and conditions to be imposed upon him. Doctors are human, with wives and families of their own to care for. No more than other men can they be expected to appreciate expropriation, injustice, or State-imposed uncertainty about their future. The Negotiating Committee has been advised on high legal authority that certain sections of the Act are contradictory. It is also advised that the Minister's interpretation of these clauses is mistaken in law, and that, in any event, such ambiguity exists as to render it difficult and dangerous for doctors in partnership to determine whether or not they should enter the service. These legal arguments have been brought to the attention of the Minister. He has made no attempt to counter them, preferring to say that if he is proved to be wrong in his interpretation, he will—presumably if still in power—proceed so to amend the Act as to make his own interpretation legally correct. Meanwhile, he leaves it to individual practitioners to fight out the issues in the courts at their own expense. Needless to say, no amount of retrospective legislation, if such indeed proves eventually to be necessary, can put right the transactions which will have taken place on the false assumption that the Minister's interpretation is correct. Whatever happens, flagrant injustices will have been perpetrated—injustices which could have been averted had the Minister consented to amend these clauses before the Act comes into force instead of afterwards. Here in fact was the crucial test of the genuineness of the Minister's declared intention if convinced by argument to amend the Act. He has declined to amend. Did he ever intend to amend?

In the field of hospitals and specialists' services the Minister makes some concessions which may or may not survive his tenure of office. Meanwhile, they may relieve some of the anxieties of specialists. The main changes are to remove the ceiling of professional fees for a proportion of private beds and to promise not to take over nursing-homes even though they are not conducted for profit. A number of other issues are raised by the documents. For example, there is no evidence in the Minister's reply of any relationship between the proposed remuneration of the general practitioners and the recommendations by the Spens Committee, which he accepted in principle. The profession has repeatedly asked that before a doctor is dismissed from the service he should have the right of an appeal to the courts, against the Minister's ruling. This right of appeal, which would be a protection for the public as well as for the profession, is still denied.

ONE FINAL QUESTION

The issue now rests with the profession. On Jan. 31 a plebiscite of the whole profession will be taken and on the results of that plebiscite the British Medical Association will determine its future action. It must be made clear that whatever the result no doctor will be advised not to render service to his patients or not to continue with his professional work. If the profession decides against service, consultants and specialists will be advised to continue with their hospital work, meanwhile refraining from entering into contract with regional hospital boards; general practitioners will be advised to continue with their practices but without entering into contract with local executive councils; public health officers will be advised to continue with their work under local authorities. Parliament has given to every doctor the right freely to enter or not to enter the service. Indeed the Minister, in his reply, draws attention to this right. The medical profession, while never willing to withdraw its services from the public, is fully entitled to say that the State service offered is, in its considered view, opposed to the best interests of the public and the profession.

The task now before the profession is to strip the non-essentials from the essentials, to distinguish between the shadow and the substance. Despite the Minister's promise that if convinced he would seek amendment of the Act, he has remained unconvinced and impervious to argument, and thus for nearly a year we have worked at the conference table to no purpose.

There remains one final question and one central issue. Does the service as described by the Minister conflict with the traditions and standards of a great profession? There is only one answer the Council of the Association can give to this question. It does so conflict.

B.M.A. REPRESENTATIVE MEETING

A SPECIAL representative meeting of the British Medical Association will be held at B.M.A. House, Tavistock Square, London, W.C.1, on Thursday, Jan. 8, at 11 A.M., to consider the council's recommendations "relating to a statement on the Minister's reply to the Negotiating Committee's representations; and the impending plebiscite of the medical profession."

CORRIGENDUM: *National Health Service.*—In our summary of the Minister of Health's reply to the Negotiating Committee (Dec. 20, p. 924), under the heading of Remuneration, we noted the gross incomes obtainable for various numbers of patients. These were described as "inclusive of receipts from private practice, obstetric service, mileage, &c.," but the word *inclusive* should have been *exclusive.*

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Modern Hospitals

I

A FRENCH ARCHITECT'S VIEW

JEAN WALTER

ARCHITECTS have, in general, escaped the specialisation now commonplace in most other professions. Some architects, it is true, specialise in industrial design and others in monuments; but most are prepared to turn their hand to any branch of the whole field. The proper use of new materials calls for specialisation; and the need for this is nowhere clearer than in the planning of hospitals.

The literature on medical architecture is very scanty; and those who propose to engage in it must first travel in order to acquaint themselves with the ideas of others. It will be found that each centre has something to offer: Munich has a model linen-room, Budapest the perfect kitchen, Alexandria the best infectious-diseases department, and Chicago an excellent sound-proofing system. The integration of each facet can be achieved only by team-work; and the medical architect's office should comprise a series of sections—one for constructional engineering, another for hospital heating, a third for sanitary engineering, and so on—each section being headed by a specialist who himself has travelled and observed the treatment of his subject elsewhere.

GUIDING PRINCIPLES

Economy.—Hospitals are now far more compact than in the pavilion era, of which the Virchow Hospital in Berlin is an example (fig. 1). In part, this compression has been achieved by designing buildings of greater height. Unhappily, too little account is still taken of the extra cost in construction, maintenance, and operation imposed by the extravagant use of space. In the Virchow Hospital, at Lyons, and at Grange-Blanche the cubic space per bed is about 330 cubic metres. By careful planning I have gradually reduced the space as follows:

Hospital	Total capacity c.m.	No. of beds	c.m. per bed
Beaujon-Clichy, Paris	263,637	1100	240
Lille	299,770	1290	233
Ankara	156,000	940	166
Istanbul	125,337	1224	102
Latest plans	180,000	2000	90

The change is illustrated in fig. 2.

Research into relation of design and function.—All passages should, I hold, be short, independent, and at right-angles to each other. The proper disposition and size of passages and rooms cannot be determined without an understanding of the work of those who will use them. The lessons of job analysis have been widely applied in industry: in hospitals they have received but little attention. Plainly, most medical procedures do not lend themselves to analysis; but in hospitals there is other work—preparation and distribution, cleaning, sterilisation, and interdepartmental movement and transport—which, no less than in industry, can be accurately computed. My practice is to study the timing of each of these routine operations. The aim is to create an organisation supple enough to allow for initiative, and systematic enough to reduce waste in all its forms.

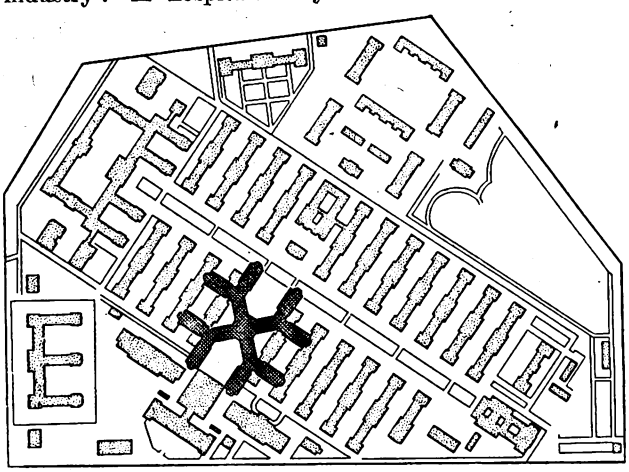
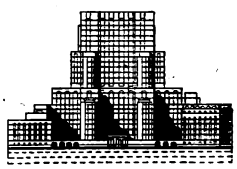


Fig. 1—Plan of the Virchow Hospital, Berlin, and, superimposed, a modern five-story hospital with the same number of beds.

Orientation of wards.—I have discarded the dogma that all wards should face south. The average stay of the acute surgical case is nowadays about 12 days, and of the medical case about 20 days; plainly sunshine is not of the first importance during this short time, and any loss of warmth through a northerly aspect can be compensated by artificial heating. The abandonment of the insistence on a southerly aspect has saved space and reduced the number and length of corridors, thus making the hospital easier to run.

Precautions against noise.—Hospitals should certainly be sited in the least noisy part of towns; but with modern sound-proofing methods it is unnecessary to banish them to isolated and inaccessible places outside towns.



New York Hospital, built in 1930
(Architects: Coolidge and Shepley)
912 beds. Capacity 525,000 c.m.
—i.e., 576 c.m. per bed

Beaujon Hospital, Paris, built in 1935
(Architect: Jean Walter)
1100 beds. Capacity 260,000 c.m.
—i.e., 237 c.m. per bed

Medical Centre, Istanbul, planned in 1940
(Architect: Jean Walter)
1224 beds. Capacity 125,000 c.m.
—i.e., 102 c.m. per bed

Design for medical centre, planned in 1943
(Architect: Jean Walter)
2000 beds. Capacity 180,000 c.m.
—i.e., 90 c.m. per bed

Fig. 2—Showing the progressive reduction in space per bed. The façades are reproduced to the same scale.

Flexibility.—Needs change; and every hospital should be designed with an eye to the future. All special departments and all master corridors should be so arranged that, whatever the future reallocation, it can be carried through without difficulty. Thus, partitions between rooms, laboratories, and special clinics should be easily removable so that their size can be increased or diminished as occasion demands. Moreover, the possibility of future expansion in the number of patients has to be borne in mind.

Standardisation.—The present diversity of hospital materials and equipment derives not from variety in need or taste but from improvisation and lack of planning. Cost could be reduced if, not only throughout one hospital but throughout the country, staircases, doors, windows, hardware, lifts, and other furniture and equipment were made to a common design.

DESIGNING A LARGE HOSPITAL

This account will be restricted to the planning of the hospital itself; a fuller account of this and of the planning of outpatient departments and of medical schools has been given elsewhere.[1]

Experience shows that for economy and ease of operation the hospital building should be of 5–8 stories. A basic consideration is the allotment of traffic-lanes. In hospitals designed by me there are no fewer than 8

1. Walter, J. Renaissance de l'Architecture Médicale, Paris, 1945.

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of these lanes: (1) for outpatients; (2) for inpatients; (3) for visitors and doctors; (4) for distribution of food; (5) for distribution of drugs; (6) for linen; (7) for pipes, &c.; and (8) for waste matter. At first sight this precise division might seem pedantic; but the effect is to speed communication and to reduce noise.

At the centre of each plan is a core containing the lifts for patients, visitors, and food, the pneumatic tubes, and other elements vital to the operation of a modern hospital (fig. 3). The concentration of these elements eases maintenance, surveillance, and the damping of noise. Around this core I place in the basement the pharmacy and the admission department, which is reached from the outside by ramps. The ground floor contains the visitors' hall, the department caring for those patients who are able to use the gardens, and special departments catering mostly for those who can walk—dermatology, ophthalmology, and laryngology. The first few floors house the surgical department, above which is the medical department. The upper floors contain such special departments as those of pædiatrics and cardiology, while the top floor is taken up by the kitchen. The advantage of placing the kitchen at the top of the building is that here it has the freest natural ventilation, while smells from it do not permeate the building.

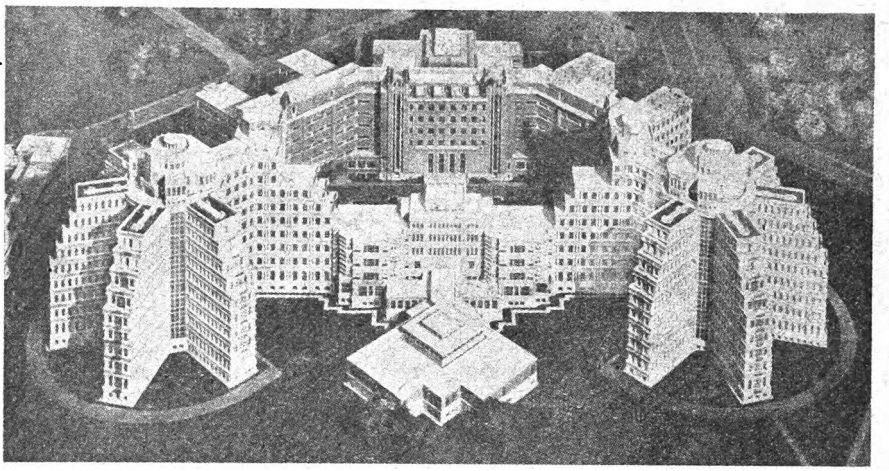

Fig. 3—Model of the Hospital Centre, Lille (architects: Walter, Cassan, and Madeline). The hospital is in the foreground, and behind it the medical school.

Each succeeding floor is slightly smaller than the one below, so each floor has a balcony. Balconies are invaluable, for they save convalescents from the need to leave the building, and they thus ease supervision and economise in the use of lifts.

ADMISSION

Ambulances are unloaded in an enclosed area, the entrance to which opens and closes automatically by a photo-electric device; it is thus possible to heat this area. From here patients are taken to the adjacent reception hall. Beside this hall is a special ward for patients admitted at night; here they may be kept until the following morning, thus avoiding disturbance of other patients' sleep. The reception hall communicates directly with the policlinic so that patients admitted after being seen as outpatients need not go outdoors; and the hall gives on to (1) an operating-theatre for urgent cases, (2) an examination room for doubtful cases, and (3) an admission office.

When the patient's admission slip is completed he passes on to another room where he receives hospital clothes; his own clothes are removed, cleaned, and hung up. The ward is warned by telephone of the patient's admission; and the admission card and medical notes precede him by pneumatic tube. The distance from the ambulance to the lifts is no more than 7 yards, while from the lift to the farthest bed on each floor is not more than 63 yards.

WARD DEPARTMENTS

Each floor has a radial design (see fig. 3); at the centre of the hub is a hall round which are lifts, offices for the distribution of food and drugs, a stretcher post, and telephone rooms. No-one can enter or leave the wards without being observed by a member of the staff sitting at a slightly raised desk in the hall. With the exception of actual attention to patients in bed, all the work of each department is done in this hall and in the rooms, separated by glass partitions, which surround it. Among the advantages of this lay-out are ease of surveillance (it is only a few yards to the farthest bed) and reduction in corridor space. Moreover, the use of the space in the central hall is not restricted to passages.

The present trend is away from large wards, which are noisy and promote cross-infection. At the same time not all rooms should be single-bedded; this is in any case precluded by the cost of construction and maintenance and by the difficulty of obtaining enough nurses; and not all patients like to be alone. Probably it is best to intermingle wards of 4–6 beds with single-bedded rooms for the gravely ill and those who can afford to pay. Single-bedded rooms might number perhaps 20% in the medical department and 25% in the surgical department. Each of the larger wards should have its own sanitary installation; and this should be reached directly through a door from the ward. Each group of wards should have its own dayroom, including a solarium, where up-patients take their meals.

I propose to supplant metal beds by hollow concrete blocks, covered with earthenware, supporting the usual spring base and mattress. This would save considerable

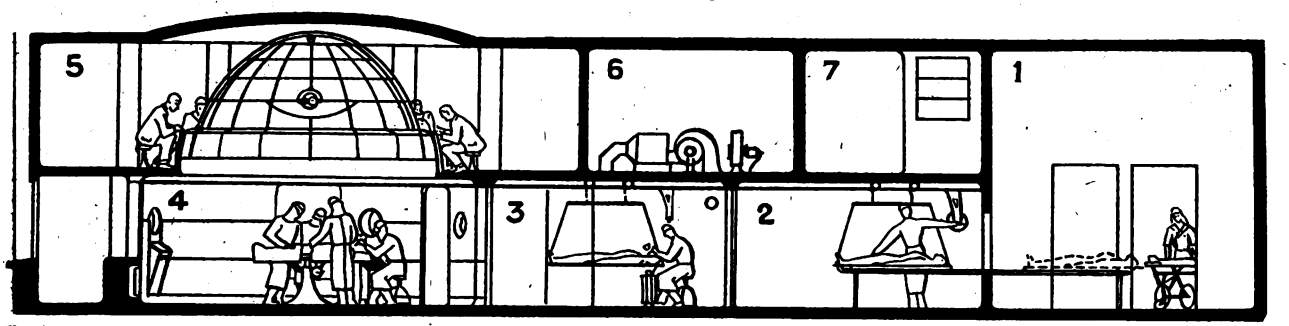

Fig. 4—Diagram of operating-block, showing: (1) first anteroom; (2) second anteroom; (3) third anteroom; (4) operating-theatre; (5) gallery; (6) ventilating plant, &c.; (7) passage.

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trouble in cleaning. Each block will contain two drawers —one for the patient's property, and the other, at the foot of the bed, for his documents and other medical necessities; a recess at the side will hold a urinal. Each bed is to have a shaded lamp on an adjustable arm and a bed-table sliding on side-rods. The block will be wired for the use of diagnostic instruments.

With built-in cupboards, wash-basins, and tables, the furniture in each room can be reduced to a few chairs; and to save stooping no piece of furniture is less than 2 ft. from the ground.

The wards are grouped in units of 18–36 beds. The office on each floor is connected by lifts with the kitchen; a food trolley for each unit is delivered to the office from which it is collected by a representative of the unit. Each department has, placed at equal distances from all its units, a large office, a pharmacy, and a routine laboratory. The only other rooms are that of the chief and (separated from it by changing cubicles) a waiting-room.

OPERATING-THEATRE

The surgical department resembles the medical; but a certain number of sound-proofed rooms near the theatre are set aside for those recently operated on.

The architect is inevitably influenced by advances in surgery. The extension of the surgeon's field to such easily infected sites as the brain calls for close attention to the risk of air-borne infection. Broadly, air in the theatre may become infected by respiration, by the admission of infected objects or of septic air, and by the projection of dust from the lighting apparatus above the operating-table. These risks I have countered by arranging that all except those actually participating in the operation shall be outside the theatre; by preventing the entry of infected objects; by sterilising and conditioning the air; and by placing an airtight glass shield across the roof below the light.

Each operating block includes two theatres, each taking the form of a cylinder 6 ft. 6 in. in height and 17 ft. in diameter (fig. 4). This form has been chosen because with it the greatest possible circulation of conditioned air is achieved. The roof is formed by an airtight glass panel beyond which is the lamp illuminating the field of operation. This lamp is placed at the centre of a large ellipsoidal reflecting cupola, so that the beams are directed on to the operating-table at an angle of 135°. The lamp, which is water-cooled, can be electrically raised or lowered or displaced eccentrically. Surrounding the cupola is a balcony, seating 30 people who can follow the operation by means of a mirror. Vision centres almost vertically above the operating-table; and as the eye is only 7 ft. 6 in. from the surgeon's hands vision is good. A theatre of this design was built at Lille in 1936 for Professor Lambret.

The operating-table is on a fixed pedestal which holds the controls for the electrical movement of the table itself. The hollow centre of this pedestal also contains electric wires for cauteries, and tubes for compressed air and aspiration.

No theatre can remain sterile unless it is separated from the general traffic of a hospital by a series of screening chambers, and unless its atmosphere is at a higher pressure than that in the surrounding rooms. The patient for operation is taken to the first of three anterooms, where his blankets and protective clothing are removed and he is placed on a sterile stretcher. He is carried into a second room where he is clothed in sterile gowns and is placed on a sterile stretcher dependent from an overhead monorail. On the monorail he is pushed into the third room to be anæsthetised. When he reaches the theatre he is taken direct to the operating-table by the monorail; there the four "arms" holding the corners of the sterile canvas stretcher are withdrawn. The patient thus lies on this stretcher throughout the operation; and at the end the arms can be reinserted into the stretcher slots and the patient removed without trouble.

CONCLUSION

Strict rationalisation should be the first aim of the medical architect; at the same time the patient must not feel that he is caught up in a medical machine. The resolution of these conflicting purposes is one of the architect's principal problems.

Medicine and the Law

Contraceptives and "Consummation"

THE Divorce Courts' jurisdiction in nullity suits has inherited not a little from the ecclesiastical authorities of earlier centuries. A medieval divine, however, would probably have been appalled by the decision lately given by the House of Lords in Baxter *v.* Baxter. The Matrimonial Causes Act of 1937 made a marriage voidable if it had not been consummated and if the non-consummation was "owing to the wilful refusal of the respondent." Hitherto judges have been inclined to hold that coitus in which a contraceptive is used cannot be deemed consummation, and therefore that refusal of coitus except when contraceptives are used is wilful refusal to consummate. In this the judges were consciously guided by the language of the marriage service as set out in the prayer-book of the established Church of England. They accepted the view that the procreation of children is one of the principal ends, if not the principal end, of marriage. Contraceptives prevent procreation; therefore coitus with use of contraceptives is not consummation. The House of Lords now displays a modernist attitude. The phraseology of the prayer-book, observes the Lord Chancellor, must not be too strictly relied upon. Procreation can happen without marriage; marriage can be consummated without procreation. The begetting of children is not a principal end of marriage as understood in Christendom. Procreation is not the test in a nullity suit; the sterility of the husband and the barrenness of the wife are alike irrelevant.

Disdaining any prudish exhibition of judicial ignorance, the Lord Chancellor remarked that it is well known that there are different methods of contraception in common use. Long before the Herbert Act was passed in 1937, he said, it was common knowledge that reputable clinics were advising married people on what was popularly called birth control, and that many young married couples agreed to take contraceptive precautions in the early days of married life. When, therefore, Parliament used the word "consummate" in the 1937 Act, the word must be interpreted as understood in common parlance and in the light of social conditions known to exist.

This new and authoritative decision by the final appellate tribunal overrules the judgment of the Court of Appeal in Cowen *v.* Cowen in 1945 where, in view of the husband's insistence on the use of contraceptives, it was held that the marriage had not been consummated.[1] One may perhaps detect in Lord Jowitt's recent speech in the Lords a sense of judicial relief that the courts may now be spared inquiry into the physical relationships of husbands and wives—a topic which judges are traditionally reluctant to embark upon in actions concerning legitimacy. The Court of Appeal had concluded that Mr. Baxter acquiesced, though doubtless reluctantly, in the condition imposed by the wife, and did so for ten years; "a reluctant acquiescence," said the lords justices, "was nevertheless an acquiescence," and the petitioner who succeeded only in proving a refusal in which he had acquiesced did not establish that non-consummation was due to a wilful refusal by the respondent within the meaning of the 1937 statute.[2] In dismissing Mr. Baxter's appeal, the House of Lords has held that, if he could have established a ground for relief, nothing in his conduct had disentitled him in the circumstances from obtaining the relief. As, however, insistence on the use of contraceptives was not a refusal to consummate, he had failed to establish his claim to a decree of nullity.

1. *Lancet*, 1945, ii, 183, 215. See also the case of J. *v.* J., *Lancet*, 1946, ii, 851.
2. *Ibid*, 1947, i, 342.

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In England Now

A Running Commentary by Peripatetic Correspondents

WHEN I was told to go from Hamburg to Schleswig to relieve the R.A.M.C. surgeon there for a week I thought I would see the main medical attraction in that part—the clinic of Professor Küntscher, who developed the intramedullary nailing of fractures. I phoned the professor and we fixed my visit for the Saturday. I was late, of course, as the volkswagen wouldn't start. When I arrived they were all scrubbed up (how punctual they always are, having no "transport" for themselves at all). Some obliging person had spirally broken his tibia the day before. Not a very suitable type of fracture for a nail, but I wanted to see the technique, didn't I? Then came the usual latent interval common in contemporary German surgery, while the patient and the anæsthetist get used to each other and to the open ether bottle. The operation itself takes a very short time: pulling out the leg on a frame; a peep through the Röntgen screen; a paint with *Jodine ersatz*; an awl just the right shape to pierce the ligamentum patellæ until the medullary cavity is reached; two nails in and across the fracture line; a further peep through the screen; and a few blows of the fist against the sole of the foot (Böhler, that Moses of the orthopædic Sinai, lays down that it must be 25 blows, no more, no less)—that is the operation of intramedullary nailing. It takes less time than putting a leg in plaster. Tomorrow the patient will walk and that will impact the fragments still further.

Having seen this thing I can believe that the "femurs" are back at work within six weeks and that the "arms" write letters on the evening of the operation. There is no pain, because not even "millimetre movements" can take place.

With teutonic furor a mass of X-ray films and of patients belonging to them was then hurled at me for three hours, the well-nailed hind leg of the Colonel's bull terrier among them. The professor had nails made for horses too, but he is afraid that any owner would prefer the prospect of a nice steak to that of a horse's nailed leg, however swift.

I was amazed to see nails going across children's epiphyseal lines; growth does not seem to be interfered with. I saw an old lady of 72, looking like the aunt of Frederick the Great, who had had her broken neck of humerus nailed from below. "How are you?" asked the professor. "As you would expect to be after having been operated on by an artist," said she. "What can you do with your arm?" "What can I not do with my arm?" she replied waving it about like a Deryish.

Thinking it all over afterwards I asked myself why, if dismantling must go on, the professor should not be included and be asked to come to Britain?

* * *

When I saw that Mr. Nicolson's lecture on The Health of Authors was in THE LANCET, being a busy locum tenent, I put it aside. That, I said, will go splendidly with the cigar and port on Xmas afternoon. It is now Xmas evening and I feel impelled, possibly partly by the port, to comment, even to criticise.

The first weak point in his thesis, surprising in one so observant and experienced, is that he thinks because his authors and poets lived the average number of years, indeed exceeded the average, therefore they must have been healthy: "... of weak bodily constitution and as such liable to premature death," is the relevant passage. In reality the reverse is the truth—mild degrees of ill health make for carefulness and longevity, the cracked jug lasts longest; whereas there are dangers, great dangers, inherent in robustness. Mr. H. G. Wells with his early hæmoptyses is quite typical of the person with a weak chest who has to be circumspect and lives till nearly eighty. Osler once wrote a paper on the advantage to middle-aged men of having had a trace of albumin found in their urine; how much better for them if it had been found in boyhood! Some bodily infirmities, then, make for longevity; indeed, Mr. Nicolson's figures bear this out.

His second weak point, it appears to me—on the port tack—is that Mr. Nicolson does not appreciate that the toxin of an illness like tuberculosis, influenza, or pneumonia or a narcotic like alcohol makes its victim revert to the picture-thinking of childhood and its phantasies, whose function is exploratory and preparatory. Tuberculosis is the most important because it is the most chronic; the leak from behind the fibrous barrier can continue for years without doing much harm. Mr. Somerset Maugham in his *The Summing Up* says that during the two years he was in a sanatorium—he was middle-aged then, mark you—his fancy was like a barque under full sail. Although Mr. Maugham is a doctor there is no evidence that he realised why his fancy was free and bounding, but that always does occur with slight tuberculous toxæmia. A profound toxæmia, however, brings intense depression or elation.

But to come off my hobby-horse, I have several minor quarrels with Mr. Nicolson. He says he has "devoted much study to the last illness of Byron," but he does not mention the post-mortem findings or even say that there was a post mortem—and a brain in a mess and a cirrhotic liver (*Brit. med. J.* 1924, i, 724). In any case, if the last illness was malaria as Mr. Nicolson and other authorities including Ronald Ross judge as the most probable, then it is not relevant to Byron's production of poetry. What is relevant is his game leg, which supplied the rebel content, the striving to equalise and surpass, of his life and poetry. Dr. H. C. Cameron made the suggestion that it was due to submeningeal hæmorrhage at birth, which would account for the two convulsive seizures. Personally I haven't the slightest doubt that it was this, this cerebral irritation, that gave him his rhythmical faculty—a faculty which can be at the same time an obsession, a reversion, and a defence. But to explain myself fully I should need at least another thousand words, several cigars, and much more port.

* * *

It was Ramadan Bairam, and I had tea on the lawn with the patients while the brass band played Sousa and Sudanese folk-songs. As dusk fell and we became less shy, the audience were stimulated into excited dances accompanying the music. Out of the shadows laughing faces—last seen on "bed-complete" that morning—appeared for a moment. Then the band played the most popular piece of their repertory, and the tempo of the dance reached its climax; the song, now a classic among the folk-music of the district, went somehow like this:

"The Penicillin, O Tumurgi. I want to die, O Tumurgi.
Call the doctor, O Tumurgi. Bring the bed-screens.
Give me the injection, O Tumurgi. On my right thigh, O Tumurgi.
Be merciful: the Penicillin, O Tumurgi.
I was put on the bed, and covered by a towel.
The Doctor stood by my side, he said I have got the medicine to make you well.
I said to him, 'No, but let this man who is going to the shop buy me some chewing-gum, of the best type there is.'
I met him near his house; I loved him from my heart.
His house is west of El-Gash;
Who will take me there? Who will help me to cross The Gash?
Fallata carried me, and helped me across the Kassala Gash."

It is jolly to see penicillin duly appreciated, but why the chewing-gum?

* * *

Most appointments to the senior staff of teaching hospitals are no doubt fair, sound, and deserved. But I would like to see a pet idea of mine introduced into the competition. This is, that all candidates (and not only the short-listed ones) should be invited to attend a week-day at outpatients, pick out at random two new patients without being officially informed of the diagnoses, examine them, and lecture on them to the students in the presence of the dean, two or three other members of the senior staff, and one retired member ("consulting physician or surgeon"). In this way, I feel certain, the competition would be livelier, more interesting, and more likely to reveal the best teacher among several deserving candidates. And if an outsider got in occasionally, would that not be all to the good?

* * *

Bevandgram.—NEGOTIATIONS? O IT'S NEGATION.

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Letters to the Editor

CENSORSHIP OF MEDICAL ARTICLES

SIR,—One of the minor pleasures of the ex-Service doctor returning to civil life is the consciousness that no longer will efforts at literary self-expression have to be submitted to others for scrutiny, criticism, and maybe alteration before they can be subjected to the editorial filter. Such interference with a fundamental freedom was one of the many sacrifices made during the war years and, as far as the Services are concerned, it still continues in the "peace."

The serving doctor, as any other member of H.M. Forces, is bound by King's Regulations, of which paragraph 547 (*a*) states that an officer or soldier is forbidden to publish in any form whatever, or communicate, either directly or indirectly, any military information or his views on any military subject without special authority. Further, paragraph (*b*) says: "Any information of a professional nature that he may acquire while travelling or employed on duty will be regarded as the property of the War Department and will not be published in any form without the previous consent of the Army Council or, in the case of an officer or soldier serving in India, of the Commander in Chief."

These arrangements are no doubt justifiable if the author wishes to write of pill-boxes, armoured vehicles, military tactics, nautical manœuvres, or the techniques of precision bombing. Again the response of patients to the effects of certain gases, of high altitudes, or of atmospheric pressures, if published indiscriminately, might betray the broad schemes of the strategists, and any descriptions of disease stating the numbers afflicted could in turn reveal the approximate total numbers of troops concerned. Hence certainly in times of war, and perhaps in times like the present, medical articles by Servicemen should be vetted on the grounds of security.

Granted that this is necessary, one would have thought, however, that some quick and ready method would be employed so that this unpleasant business could be overcome with the minimum of embarrassment. But no, the author has to enclose a statement "from the authority (if any) under whom the applicant is immediately serving that such an authority has no objection to permission being applied for."

This item is a discouragement for all who have not taken the first plunge with the pen. They are naturally diffident of their efforts, and having to expose their known or suspected nakedness to one with whom they have daily contact, and one who may inquire later in the presence of others as to the fruits of their labours, prevents many from ever taking up the pen at all. This is not all; for although King's Regulations infer that the article may then be sent direct to the fountain-head, in actual practice it has to be forwarded, at least in duplicate, through a number of relay stations where much time is spent by the various clerks in writing letters to accompany it on its journey.

When at last it reaches its destination, its travels are often just as lengthy in time if not in distance; for, quite apart from the necessary scrutiny for security reasons, it will often be referred to various responsible individuals for their opinions and must wait until these officers with far more pressing claims on their time can give it their attention. This extensive business completed, one would think that many alterations would be proposed; but this is not in fact the case, and indeed the alterations suggested are often trivial.

When all is done, a letter is prepared giving permission for the article to be published in the journal applied for; and this letter, together with a now very dog-eared and unusable copy of the article, returns by the tortuous path by which it came, losing a covering letter one day and acquiring another the same day, next day, or an indeterminate number of days after. When it reaches the author, perhaps months have elapsed since he last saw it and he may desire to add new material in the light of work done in the interval, or indeed to send it to a different journal. To obey the law means that the whole dreadful process will have to be borne anew. Many of course will have already disposed of their work; for at the present time, long as the interval may be before obtaining the necessary sanction, that between an editor receiving an acceptable article and the setting of it into type is even longer. The author has however been refreshed by a printed slip of acknowledgment and knows that his objective has been reached.

This state of affairs has damped the enthusiasm of the young doctor, and valuable historical matter has been lost as a result. Today the same doctor who entered the Services as green as a caterpillar is demobilised and with the others is waiting as powerless as a chrysalis while his conditions of life as a butterfly are being planned for him. Soon he will emerge and spread his wings—not it is hoped to find his world too small and his freedom curbed. Let our planners look to this matter of the censorship of medical articles and ensure that no smell or fraction of censorship for any reason, by anybody other than the editor of a journal, be even contemplated in the New Order that is upon us.

London, W.2. R. R. WILLCOX.

LONDON AMBULANCE SERVICE

SIR,—I have read with considerable interest the letter from the secretary of the Emergency Bed Service, published in your issue of Dec. 6, and would like to give some factual details of the ambulance facilities provided by the London County Council.

The London Ambulance Service consists of two sections—"accident" and "general"—and has at its disposal some 300 ambulances, ambulance omnibuses, and ambulance motor-cars, and an operative staff of between 400 and 450.

The *accident section* undertakes the immediate conveyance, at any time of the day or night, of emergency cases, including victims of accidents, "life or death" illness, and parturient women; the last are mostly "booked" cases. An ambulance is always dispatched immediately a call is received, and the average time taken to reach the patient is $7^1/_2$ minutes. The number of these calls in 1946 was 56,971, involving 58,551 patients. It is of interest to note that the number of parturient women conveyed in these ambulances has risen from 13,520 in 1938 to 20,653 in 1946.

The *general section* provides for the removal of patients suffering from illnesses which normally do not come within the categories dealt with by the accident section; and they include the ordinary admissions to hospitals for whom a bed has been provided. These calls are answered as promptly as resources permit, but at times removals must take their turn, although a degree of preference is always exercised in the light of information received regarding the patient's condition. Invariably there is a tendency for calls of this type to "pile up" at certain times in the day, which appear to coincide with the return of practitioners from their rounds, and this contributes to the delay in the removal of non-urgent cases. The number of journeys made by the "general" ambulances in 1946 was 141,326, involving 287,780 patients.

The extension of the service, provided originally for L.C.C. hospitals only, to admissions to voluntary hospitals, and the increase in the number of outpatients, have placed a new burden upon the ambulance service. The number of patients taken to voluntary hospitals is now about 10,000 a year, and some 260 outpatients are conveyed to and from hospitals daily. The service has also been called upon to perform many other new duties—e.g., conveyance of tuberculous patients to and from dispensaries, and of analgesia apparatus for use by domiciliary midwives. At the present time as many as 800 applications a day for ambulances are received and dealt with by the ambulance switchboard staff at County Hall.

To answer immediately all "general" calls received at peak periods a service four to five times as large as the present one would be required: neither vehicles nor staff are available for this.

It is true, as Mr. Peers says, that the ambulance service has suffered acutely from an inability to replace the pre-war vehicles. The council has approved a vehicle replacement programme and has also agreed to the proposals of my committee for an enlargement of the service to cope with the increase of work which it is realised must follow the introduction of the National Health Service next July. The success of the measures proposed must, of course, depend on the availability of man-power, premises, and vehicles. In view of the

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present difficulties in implementing the vehicle replacement programme the council has undertaken an extensive programme for the reconditioning of the pre-war ambulances. These are now coming into service and, together with the fleet of civil-defence ambulances which the council acquired and adapted for peace-time use, will, it is hoped, suffice for immediate needs.

REGINALD STAMP
Chairman, Health Committee,
County Hall, London, S.E.1. London County Council.

DEATH AFTER MYANESIN ANÆSTHESIA

SIR,—In THE LANCET for Dec. 20 Professor Hewer and Dr. Woolmer describe a death following an operation during which 'Myanesin' was administered in the anæsthetic technique. This postoperative death was associated with *hæmaturia* and the traumatic uræmia syndrome.[1] It seems that because *hæmoglobinuria* (a phenomenon not to be confused with *hæmaturia*) has been reported following the use of myanesin, but without harm resulting,[2] Hewer and Woolmer conclude that the death they report was due to that drug.

As a classical non-sequitur this opinion is, in my experience, unique. The patient whose death is described had a period of hypotension during the operation of appendicectomy. That this is unlikely to have been caused by myanesin is clear because: (1) it followed the last only of three consecutive injections of myanesin; (2) it occurred no less than 10 minutes after it, whereas lowering of blood-pressure, a rare concomitant of myanesin administration, when it does occur appears within a few minutes and is slight (10–15 mm. Hg) and transient. In addition, this patient appeared (*a*) to have suffered from rheumatic fever; (*b*) to have been a chronic invalid; (*c*) to have been suffering from some obscure blood dyscrasia. Furthermore, I suggest that to maintain good surgical anæsthesia for major surgery with nitrous oxide and oxygen only, following a minimal dose of thiopentone (0·25 g.), would hardly be possible in any but an almost moribund patient (or one already suffering from severe surgical or traumatic shock) without severe oxygen restriction.

To conclude that this patient died from renal anoxia would appear to be perfectly correct, especially in view of the amount of assorted pathology already handicapping her. I suggest oxygen lack during anæsthesia as the cause of her hypotension and subsequent renal anoxia, and as the rational and scientifically deduced predisposing factor.

Finally, I would deprecate these dramatic but haphazard accusations based on ill-founded evidence (one case only, suffering from a variety of morbid states) directed against a drug on trial, the subject of careful scientific investigation by a number of workers, and which may prove to be a valuable agent in anæsthesia.

London, W.1. F. BARNETT MALLINSON.

CHILD GUIDANCE

SIR,—Your leading article of Dec. 6 demands careful study by all concerned. Experience of child guidance during the past 12 years leads me to support your view that this preventive mental-health service should remain an integral part of the School Medical Service, which occupies a position intermediate between the interests of education and health.

The factors which lie behind psychologically determined disorders in childhood are multiple: they include a faulty child-parent relationship, faulty inter-parental relationships, and faulty environment at home or at school. Our organisation for their investigation and amelioration must therefore be flexible. It was to this end that the child-guidance team was originally constituted, and there seems little reason to change the essential structure of that team. The question of "status" within the team has long been discussed, and not always without acrimony; but surely "status" is something which develops within each individual team. There are certain functions which each member by his or her training and registration is fitted to perform; and where contact with official administrators is necessary in the interests of the team one member should be designated to perform this function. Experience shows that on this basis the tasks of the team are carried out most smoothly.

Naturally, in work of such complexity, a more rigid and closely integrated form of organisation has a certain charm; but careful consideration is needed before any change from the present arrangement is made. As you say: "this harnessing in unity of potentially divergent forces . . . remains the main strength of the movement," and the possibilities of further progress will be enhanced rather than diminished by the existence of these forces.

Growth is rarely unassociated with some degree of pain and stress, but that in no way minimises the importance of a gradual maturity. However enticing a picture of administrative efficiency may appear at times, it is surely of inestimable value that "growing pains" in the service shall be permitted, and that the work may continue to attract persons not only of ripe clinical experience but of all disciplines and flexibility of mind.

Taunton, Somerset. R. SESSIONS HODGE.

SIR,—We read with pleasure your leading article in the issue of Dec. 6, and should like to express agreement with the suggestions put forward for maintaining the child-guidance services under the administration of the School Medical Service. In view of the objections raised by the Child Guidance Council, and apparently shared by you, to Blacker's scheme, the following quotation from the 1947 report of the Bradford child-guidance clinic may be of interest:

"The logic of Blacker's suggestion is that there should be the two establishments in any area, the former under the Education Authority and the latter the province of the Health Authorities. . . . I cannot oppose this suggestion too strongly as a definitely retrograde step, counter to all previous appeals for unity of direction in child care. It only adds one more department to an over-elaborate and already complicated set-up. Education and mental health over-lap considerably and in practice they can hardly be separated. . . .

"There is no doubt in my mind of the advantage of one large establishment with division of the work amongst a variegated staff under the overall direction of the psychiatrist . . . ."

This system has been practised in Bradford for over seven years now, with considerable success.

H. EDELSTON
Medical Director.
Child Guidance Clinic, P. S. HOUSE
Bradford. Psychiatric Social Worker.

SYNTHESIS OF VITAMIN A

SIR,—In your leading article on Dec. 20 no reference was made to the latest achievement in this field which has its origin in a detailed survey of the possible modes of synthesis of vitamin A made by Sir Ian Heilbron and his co-workers.[1] These authors suggested that the C_{14} aldehyde derived from β-ionone would prove a useful intermediate for the synthesis of vitamin A by condensation with acetylene and a C_4-unsaturated ketone. Heilbron explained how this idea could be developed, but, as he stated in his recent Pedler lecture to the Chemical Society, was prevented by war-time conditions from himself prosecuting the work. The scheme has now been developed by a group of Swiss chemists, who have recently published their findings,[2] into an attractive method of synthesising the pure vitamin, using the C_{14} aldehyde and an acetylenic alcohol as intermediates.

Research Division,
Glaxo Laboratories Ltd. T. F. MACRAE.

SIR,—Your leading article contains several inaccurate statements concerning the work of van Dorp and Arens.[3]

The C_{18} ketone, derived from β-ionone, was condensed with ethoxyacetylene (and not ethoxyethylene) by means of a Grignard reaction. The resulting disubstituted acetylene (which is not a C_{22} ketone) was partially hydrogenated to yield the corresponding ethylene derivative, and the latter treated with hydrochloric acid to give vitamin-A aldehyde. Further, β-ionone is

1. Darmady, E. M. *Brit. J. Surg.* 1947, **34**, 262.
2. Pugh, J. I., Enderby, G. E. H. *Lancet*, 1947, **ii**, 387.

1. *J. chem. Soc.* 1942, p. 727.
2. Isler, O., Huber, W., Ronco, A, Kofler, M. *Helv. chim. Acta*, 1947, **30**, 1911.
3. van Dorp, D. A., Arens, J. F. *Nature, Lond.* 1947, **160**, 189.

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not readily extracted from natural sources but is only conveniently prepared from citral.

As you say, vitamin-A acid has been obtained by Arens and van Dorp,[4] but it is also of interest to note that very similar syntheses were being studied simultaneously by both Heilbron [5] in this country and Karrer [6] in Switzerland, with their respective schools.

Finally, I should like to draw your attention to the synthesis by Isler et al.[7] of pure crystalline vitamin A by a method similar to that proposed earlier by Heilbron and his collaborators.[8]

B. C. L. WEEDON.

Department of Organic Chemistry, Imperial College of Science and Technology, London, S.W.7.

TIT-BIT

SIR,—The British Trust for Ornithology is inquiring into the opening of milk bottles by tits and other species of birds. The habit is not universal, and may have spread in an orderly fashion through tit populations. Problems of the greatest interest to students of animal behaviour are involved.

In reaching the closing stages of our inquiry we have reviewed the collected information and are anxious to consult a group of educated observers distributed evenly over Great Britain. Such a group is formed by the medical practitioners.

Whilst we fully realise how very busy your readers are, we would be extremely grateful for postcards, addressed to R. A. Hinde, 31, Mount Pleasant, Norwich, stating: (1) species of bird; (2) civil parish and county; (3) year in which observer could first have noted the habit (i.e., year since which observer has lived in the district); (4) year since which milk has been available in bottles to tits in the district; (5) year in which opening of milk bottles by birds was first actually observed; (6) type of bottle-closer; (7) any other information, including method of opening; (8) observer's name and address.

JAMES FISHER
ROBERT A. HINDE.

EUROPE'S NEED

SIR,—We have read with considerable interest your leading article of Nov. 22 concerning the recent report published by the medical division of the International Committee of the Red Cross on health conditions among the civilian population of certain European countries affected by the war. We thank you for your criticisms and observations, which are of great value to us.

As you are aware, it is very difficult today to obtain statistics, and still more difficult to check their accuracy. We are accustomed to scrutinise most carefully the information we receive from various sources. As regards Germany, we have quoted either from the official data furnished by the occupying authorities, or from the information published by the local authorities. Having read your leading article, we verified the figures for tuberculosis in the American zone, as given in our report, and noticed that a material error had crept into our text. The figures indicated do not refer to the *death-rate* (mortality) from tuberculosis, but to the *sickness-rate* (morbidity). We are grateful to you for having drawn our attention to this mistake, which has been corrected in the reprint of the report.

The figures relating to tuberculosis in Schleswig-Holstein (British zone) to which your correspondent, Dr. D'Arcy Hart (Dec. 6), takes exception were not quoted from an official British document, but were furnished by the German local authorities. Having compared these figures with other data received from various sources, and taking into account the facts noted by our delegates in Germany, we consider that the figures gave a fairly accurate picture. It should be remembered that 47% of the population of Schleswig consists of refugees and evacuees, who were in a very much worse state of health than the native population. A large number of these evacuees arrived in the province early in 1946, and their very high percentage among the population may certainly have led to a serious temporary increase in the local death-rate from tuberculosis.

In the introduction to the report, we made the usual cautionary remarks regarding the statistics and information furnished, and warned the reader that it was highly inadvisable to compare figures as between various countries, since such figures are largely influenced by the efficiency, or the reverse, of pre-war public-health services and of the health measures taken before 1939 in the countries named in our paper. It thus appears impossible to establish a parallel between Spain and Germany as regards the means employed to combat tuberculosis, and particularly the number of beds for tuberculous patients.

We desire to stress that the purpose of our report was not strictly scientific; its aim was to show the effect of undernourishment on the standard of public health, and the urgency of giving relief to populations affected by the war and its consequences. We endeavour to publish the most recent data referring to the situation in the various countries, and are therefore obliged to quote also from non-official sources, as official statistics are very often obsolete, and even entirely lacking in certain countries.

R. MARTI
Chief of the Medical Department of the International Committee of the Red Cross.
Geneva.

HYPERTENSION AND HEREDITY

SIR,—Dr. Hahn (Dec. 27), commenting on your annotation of Dec. 6, states that "the conception of hypertension as a hereditary disease is old." If he had cared to turn to the article which formed the chief basis of the annotation in question, he would have found in the first paragraph a reference to Morgagni more than a hundred years older than any which he quotes, together with other references to previous work on the subject. The object of my paper was to investigate the operation of heredity in hypertension, not to claim it as a new discovery.

ROBERT PLATT.
Department of Medicine, University of Manchester.

REGIONAL HOSPITALS MEDICAL ASSOCIATION

SIR,—At a meeting held in Liverpool on Dec. 21, which was attended by 64 doctors from all parts of the region that is to be covered by the Liverpool Regional Hospital Board, it was decided to form a Liverpool Regional Hospitals Medical Association.

The objects of this newly formed body are: (1) the establishment and maintenance of high standards of efficiency in the hospitals of the region; and (2) the promotion of the professional interests of the members. The members shall be registered medical practitioners who hold, or have held, positions above the rank of house-officer in hospitals, and whose main professional interest is centred in hospitals to be administered by the Regional Hospital Board.

The following committee was elected:

H. H. MacWilliam (chairman), D. W. C. Tough (vice-chairman), V. Cotton-Cornwall (secretary), O. F. Thomas (treasurer), R. L. D. S. Derham, R. J. Keating, D. Osborne Hughes, G. Williamson, H. Alstead, R. E. Kemp, T. Stanley Rogers, W. N. Chisholm, L. Findlay, D. Shute, C. M. Vaillant, J. A. Martinez, H. L. Davies, L. J. Temple, P. N. Simons.

The subscription is 10s. per annum. It is hoped that all who are eligible and were unable to attend will join at once, and that other regions will organise along similar lines.

V. COTTON-CORNWALL
Hon. Secretary,
Liverpool Regional Hospitals Medical Association.
The Poplars, Lower Lane, Liverpool, 9.

INTRAVENOUS CANNULISATION

SIR,—In your issue of Dec. 6 Dr. Clain implies that the West Middlesex needle is difficult to use correctly, and that it requires a vein junction for its successful insertion. I have not experienced these difficulties.

Surely it is a regression to abandon a simple and effective instrument in favour of a manœuvre requiring six instruments, the injection of local analgesic, and the incision of the victim's skin.

P. R. BROMAGE.
Southbourne, Hants.

4. Arens, J. F., van Dorp, D. A. *Ibid*, 1946, **157**, 190.
5. Heilbron, I. M., Jones, E. R. H., O'Sullivan, D. G. *J. chem. Soc.* 1946, p. 866.
6. Karrer, P., Jucker, E., Schick, E. *Helv. chim. Acta*, 1946, **29**, 704.
7. Isler, O., Huber, W., Ronco, A., Kofler, M. *Ibid*, 1947, **30**, 1911.
8. Heilbron, I. M., Johnson, A. W., Jones, E. R. H., Spinks, A. *J. chem. Soc.* 1942, p. 727.

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N.H.S.

SIR,—If we accept a capitation fee the total money payable to the medical profession will be more or less the same every year. As the number of doctors increases year by year our individual remuneration will steadily diminish.

Duffield, Derbyshire. F. W. SCHOFIELD.

*** Payment will be re-examined two years after the Act comes into operation, and thereafter at stated intervals. If the number of doctors increases, and a better service is rendered to patients, there will be a good case for an increase in the total payment.—ED. L.

SIR,—After careful study of the Negotiating Committee's statement and the Minister of Health's reply, together with the press reactions thereto, one is still left in some perplexity. Your own advice is to trust the Minister, and you say that "the possibility that the profession will in the end refuse to take part in the National Health Service is virtually buried—though concessions may be necessary before it commits itself." But you do not explain how these are to be secured from a Minister who has proved himself so stubborn in the past and believes he will be ultimately victorious.

What we have in these documents is the presentation of two answers to the same problem—namely, can the N.H.S. be made to work well? The Minister says: there are no difficulties about it given good will. The B.M.A. says: No! it cannot, since the sacred Principles are still violated. As the *Daily Telegraph* remarks, the position is one of stalemate. One feels, therefore, that the council of the B.M.A. should give us the inside facts to help us make up our minds. For example, could we not be given a verbatim account of the final discussions with the Minister? Did he present the velvet glove discernible in the memorandum, or was the iron hand employed? Frankly, much of the difficulty arises because no-one completely trusts Mr. Bevan—his intransigent attitude, his great powers under the Act, and his ability as a side-stepper are too well known. On the other hand, we should like to judge whether the Negotiating Committee properly presented their "cast-iron case." Only the fullest and early publication of what was said can enable the rank and file to instruct their representatives at the special representative meeting on Jan. 8.

On the question of professional discipline you somewhat naïvely suggest that the proposed machinery might work "if members of the service remain perpetually alert to the cause of professional freedom and ready to defend it at all levels. As with so much in this service the remedy here lies with ourselves." Is this a polite suggestion that, like the proletariat, we might stage a lightning strike occasionally? If doctors are not prepared *now* to insist on what the Panel Conference has already declared advisable, what possible chance is there of ministerial puppets doing anything drastic?

The Ministry's figures for remuneration are based on the assumption that 17,900 general practitioners would, voluntarily or involuntarily, take part in the scheme. But my information is that there are approximately 21,000 general practitioners, plus 2000 aliens who could come on the Register; and if all these take part the capitation fee will fall badly.

Does all this correspondence between the Minister and the committee mean that we have unequivocal grounds for giving him a dogmatic *No*? I doubt it. But as Mr. Bevan says he is not prepared to alter the Act before the new service has been tested in actual operation perhaps the best solution would be to wait until the similar scheme has been tried for a year or so in Northern Ireland. If it works there well we can all join in cheerfully and no-one will have to sign himself

PERPLEXED.

*** Our case did not rest on trust in the Minister, though we should certainly like to see less suspicion all round. The security of the profession in the service will depend not so much on individual Ministers as on the influence that doctors are able to exert. The Act gives them a position where their corporate influence should at least suffice to prevent injustice. This influence can best be extended by constructive work, and might well be impaired by threats of direct action.

The number of active general practitioners in Great Britain is estimated at between 20,000 and 21,000. This figure includes both principals and assistants, British-born and alien. It also includes a higher than normal proportion of elderly doctors, many of whom may discontinue practice after the appointed day. The Minister's estimate of 17,900 principals in practice is therefore unlikely to be exceeded in the first years of the new service.—ED. L.

Parliament

FROM THE PRESS GALLERY

Medical Practitioners and Pharmacists Act

IN the House of Lords on Dec. 18 the Royal Assent was given to this Act.

QUESTION TIME

Premature Disclosure

Mr. ASTERLEY JONES asked the Minister of Health if his attention had been drawn to premature disclosure in the press of accounts of proceedings in his recent discussions with the doctors; and whether he had any statement to make on the release of this information.—Mr. A. BEVAN replied: In certain newspapers I have been accused of premature disclosure of matters which were discussed by me with the Negotiating Committee of the profession and which it was agreed should not be published before Dec. 19. The discussions took place between some 40 representatives of the profession or officials of the British Medical Association, the Secretary of State for Scotland, myself, and some officers. So far as my right hon. friend, myself, and our officers are concerned, I can state categorically that no disclosure of any kind has been made or condoned. The motives underlying these statements can only have been to embitter my relations with a profession whose coöperation I am sincerely seeking. Fortunately, I do not believe that many in the profession are actuated by such motives.

Contributions and Benefits

Sir E. GRAHAM-LITTLE asked the Minister of National Insurance whether, as it will be impossible for many years to provide benefits in accordance with the provisions of the National Insurance Act, notably in the field of health services, he would graduate the amount of the compulsory levy for insurance under the Act, in step with the actual provision of benefits in respect of which that levy is made.—Mr. T. STEELE replied: As already announced, the benefits of the National Insurance Acts, 1946, will become fully available subject to the conditions laid down from next July when the contributions required by the Acts also become payable. As regards the health services to be provided under the National Health Service Act, although there will be continuous development of these as resources increase, the cost of the wide range of services which will be immediately available from next July will greatly exceed the sums to be provided from National Insurance funds under section 37 of the National Insurance Act and no reduction in National Insurance contributions would accordingly be justified.

Scientific Research and Industrial Production

Replying to questions, Mr. HERBERT MORRISON, Lord President of the Council, announced that he had decided, in consultation with the Chancellor of the Exchequer, to supplement the work of the Advisory Council on Scientific Policy by setting up a new committee on industrial productivity to advise him and the Chancellor how research in the natural and social sciences could best assist an early increase in industrial productivity. A number of panels would be constituted from time to time to investigate and report on various aspects of the problem. Panels now being set up included Import Substitution under the chairmanship of Prof. S. Zuckerman, M.D., F.R.S., and the Human Factors affecting Industrial Productivity under Sir George Schuster.

A Second Chance

Mr. SOMERVILLE HASTINGS asked the Minister of Education whether he was aware that a number of children certified as ineducable were now receiving and benefiting by instruction in special schools; and what steps he proposed to take to

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legalise this position.—Mr. G. TOMLINSON replied: At the earliest opportunity I propose to put forward an amendment of the law which at present makes these decisions irrevocable. —Mr. HASTINGS: Does the Minister expect that that will be during the present session of Parliament?—Mr. TOMLINSON: I hope so.

Mrs. L. MANNING: If these children, who are said to be ineducable, are benefiting by this teaching, was not something wrong with the first examination for the I.Q. ?—Mr. TOMLINSON: I do not think it is that so much as giving an opportunity to the medical profession or others to change their minds after a period of time.

Child Care

Dr. B. STROSS asked the Home Secretary what number of children were now cared for in homes organised by local authorities; what number were boarded out; what number were cared for in homes organised by voluntary societies.—Mr. C. EDE replied: About 19,000 children are being cared for in homes and institutions provided by local authorities, excluding nurseries established by local public-health authorities. About 10,000 children are boarded out by local authorities. About 31,000 children under 17 years were being cared for in voluntary homes in July, 1947. The figures exclude children in special schools and in approved schools run by voluntary organisations.

Grants for Marriage Guidance Council

Mr. V. J. COLLINS asked the Home Secretary if he was aware that the continuance of the important work of the Marriage Guidance Council was endangered by lack of funds; and if he was now in a position to make a statement on the Denning Committee's recommendations—Mr. EDE replied: This matter has been receiving my attention and I have been in consultation with the council. Before deciding what sums the House could properly be asked to provide for assisting this form of social service during the next financial year, I have come to the conclusion that it is necessary to appoint a small departmental committee to consider on what lines this service, if assisted by Exchequer grants, could be most advantageously developed. In the meantime some immediate financial help is required to enable the work of the National Marriage Guidance Council and the Catholic Marriage Advisory Council to be continued during the present financial year, and I propose, by means of a supplementary estimate, to ask the House to authorise for this purpose grants of £1200 and £300 respectively.

Production of Penicillin

Mr. T. E. WATKINS asked the Minister of Health what quantities of penicillin were being produced here; to what extent there was financial loss to public funds due to its production; and if he would make a statement.—Mr. BEVAN replied: Current production averages 520,000 mega units a month and is increasing. Production now involves no charge upon public funds.

Public Health

Poliomyelitis and Polioencephalitis

NOTIFICATIONS in the weeks ended Dec. 6, 13, and 20 were as follows:

	Dec. 6	Dec. 13	Dec. 20
Poliomyelitis	70	77	55
Polioencephalitis ..	6	7	5

For the first time since the peak week of Sept. 6 the number of cases of poliomyelitis rose in the week ended Dec. 13. During that week the only county with a notable rise was Somerset with 5 (0) cases. In the week ended Dec. 20 the most noticeable increases were in Norfolk with 3 (1) cases and Oxford with 3 (0) cases. Figures for the previous week are given in parentheses.

Paratyphoid at Ipswich

On Saturday, Dec. 20, 2 cases of paratyphoid were identified at Ipswich. Up to Dec. 30, 14 cases were notified in the borough, and 7 further cases had been admitted to the local isolation hospital from the surrounding district. Of the 14 borough cases, only 1 is in a patient over twenty years of age. There has been no death. Investigation of the possible sources, including examination of cake and cake-fillings, has not yet been completed.

End of Scabies Order

The Scabies Order, 1941, ceased to operate after Dec. 31. This order gave powers of entry into residential premises, and of compulsory examination and treatment. A Ministry of Health circular (180/47) explains that these drastic powers, introduced as an emergency war-time measure, are no longer warranted.

Obituary

GEORGE FRENCH STEBBING

M.B. LOND., F.R.C.S., F.F.R.

Mr. G. F. Stebbing, who died at his home in London on Dec. 22 at the age of 63, was a man of much ability and fine character. Respected for his work and wisdom as surgeon, radiologist, and counsellor, he was held in like affection as teacher and friend.

Having graduated with honours from Guy's Hospital in 1906, he was unwilling to enter private practice because he feared that acceptance of fees for his services might somehow prejudice his personal or professional integrity. When he told his former chief, Sir Chartres Symonds, about the kind of institutional work he thought he would like to do, Symonds replied he knew of no such post, and that Stebbing must create one for himself. With this in mind he went, in 1908, to Lambeth Infirmary, where with the encouragement of the then superintendent, A. L. Baly, he quickly won the confidence and affection of the doctors and patients of the borough. In these early days he devoted himself to all branches of medicine and surgery, and, with his tremendous capacity for work and wide reading, he became a general practitioner at hospital. As the years went by he began to acquire a more than local reputation both as surgeon and as clinical teacher. Disliking non-essentials, he had a direct approach to the things that mattered. "Many old Lambeth medical officers all over the world," says a colleague, "have reason to thank Steb, or the Great White Chief—the long white coat he wore was unusual in those days—for all he taught them. His experience was so great that his phrase, 'I am quite familiar with that,' disappointed many a junior colleague who felt he had produced a problem for him."

After a period of service in the Navy during the first world war, Stebbing returned to Lambeth, and soon became particularly interested in the use of radium for the treatment of malignant disease. Seeing, as he did, a great many cancer patients, he realised earlier than most that radiotherapy promised something new, and he was one of the first to seek knowledge at the fountain-head—the Fondation Curie under Regaud. In 1929 arrangements were made between the Lambeth board of guardians and the Ministry of Health to provide his department with radium and deep X-ray plant to treat patients from any part of London, and Lambeth soon became one of the principal radiotherapy centres in the country. Of the surgical group who contributed to the early development of radium therapy, Stebbing (writes a radiological colleague) was the only one who saw the new science as a whole and not as an adjunct to surgery, and he so developed his grasp of the subject that in his later years, while no whit less a surgeon, he became one of the trusted and loved leaders of radiotherapy. A founder of the Society of Radiotherapists, he later became its president. He was also treasurer of the

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Faculty of Radiologists, and only his last illness prevented him from taking office as president of the section of radiology of the Royal Society of Medicine. A member of the Ministry of Health's cancer subcommittee, he also gave much time to the development of the Radium Commission, and sat upon all its committees—organising, statistical, and scientific. Of his work as its honorary secretary, J. R. P. writes:

"Stebbing was the ideal man for the post, and under his guidance the commission came to hold throughout the country a position of great usefulness and importance. His complete integrity and the absence of all selfish motive made him acceptable as a mediator wherever difficulties arose. His wisdom and gift for friendship led not only young men but also senior colleagues to seek his advice and help. If British radiotherapy today leads the world it is largely because of the ideals Stebbing set himself in developing the commission's policy. He determined first to build up radiotherapy centres and later to add facilities for all forms of cancer treatment and to centralise these adequately in the provincial English and the Scottish university regions. In this, as in all things, he visualised the perfect pattern—adequate equipment, adequate staff, with a physicist as an essential member, enough room and enough beds. On this he insisted, and on all of it. Again and again he got what he wanted where a lesser man would have failed. When he seemed to fail it was only a respite and he returned to the attack with tireless enthusiasm.

"It is difficult to epitomise this amazing man's chief characteristics and to find the reason why his contribution to his profession was so great. Courage both moral and physical he had in abundance, but courage was not the main source of his strength. Tireless energy overflowed, but that alone could not have produced such results. Selflessness he possessed to an extent unusual in a man of his drive and personality. You never could feel that Stebbing was playing for his own hand. Clear and objective thinking explain some of his success, but were only the tools which shaped it.

"Perhaps the nearest we can get to the kernel of his personality is to say that he always aimed at perfection. Linked with this was an unquenchable optimism. The perfect could be achieved if one strove hard enough for it. I shall never forget his reply at a council meeting when I begged him to compromise on some matter or another. 'I never compromise,' said Steb. That perhaps is the nearest we shall get to his real soul: he never compromised with ideals. Others will take up little bits of the task he left incomplete. None can fill his shoes."

In 1934, as a member of twenty years' standing, Stebbing was elected to the fellowship of the Royal College of Surgeons, and lately he had served on their council. Though a critic of what he conceived to be wrong with the service he had entered, he was a loyal servant of the London County Council, and he was largely responsible for the formation of the L.C.C. clinical research committee, from which developed the L.C.C. Medical Society, of whose council he was the first chairman. He was also chairman of the council of the Medical Protection Society, where his loss will be severely felt.

"Week by week," writes E. R. C., "Stebbing gave sound advice to members of the profession in distress; week by week his wisdom and courage came to the support of any and every man whose case must be fought in the courts. Himself meticulously observant of every rule of surgical conduct and every ethical principle, for others he brought compassion and sympathy to mellow his own strict views of correctitude, and he always insisted that the case for the defendant should be put with clarity and force, even when he felt that to be all he could do. Of all the men with whom I have been associated during my professional life, Stebbing was the most single-minded, the most fearless, and least self-regarding in his pursuit of what he believed to be right. He could not bring himself to compromise, and for that reason many people both underestimated his worth and thought him difficult. As a committee-man his qualities did sometimes make him a little intolerant of other opinions; but those who knew how exclusively his views were based upon what he believed to be fundamental principles, and how utterly devoid he was of consideration for his personal interests, tolerated his unyielding attitude and listened with respectful attention to his statement of a case."

When the late war broke out, Stebbing's reaction was characteristic. He and his wife left their own home and went to live in the hospital so as to be with his patients and staff. There, under far from easy conditions, they stayed for most of the war, and used the opportunity through work "in their spare time" to improve the care and attention in the wards for the old and infirm. Mrs. Stebbing survives him with a daughter and two sons, both of whom are studying medicine.

ARDESHIR HORMASJI MASINA

M.D. CAMB., M.R.C.P.

Dr. Ardeshir Masina, who died on Dec. 15 at the Masina Hospital, Bombay, at the age of 36, was the youngest son of Dr. Hormasji Masina, F.R.C.S., who founded the Masina Hospital in 1907. Adi, like his brothers and sister, was educated in this country, and later entered the medical profession. From the Leys School, Cambridge, he went to Emmanuel College, and completed his training at St. Bartholomew's Hospital, qualifying in 1936, and taking his M.B. two years later. He became house-physician to the medical professorial unit at Barts for a year, and later he was house-physician at the London Chest Hospital and R.M.O. at Bradford Royal Infirmary. In 1940 he took his M.R.C.P., and in 1943 was awarded the M.D. for his thesis on bronchiectasis.

It had always been his intention to carry on the work of the Masina Hospital, and in 1942 he returned to Bombay. When his father, who was then over 80, died in 1946, additional responsibilities fell to Ardeshir in connexion with the management of the hospital. He became a leading consulting physician, and though his interests were wide, he had special experience in diseases of the chest. He brought to Indian medicine a wealth of medical knowledge and culture from the West which combined with his experience of tropical medicine to give him an exceptional breadth of outlook, and his scientific attitude to disease would have been of outstanding value to Bombay and the Parsi community. Gifted with an acute and alert mind, he was quickly able to grasp the essentials of any problem and to solve it with tact, wise judgment, and precision. Gentle and approachable in manner, he was kindness itself to his patients and to his colleagues. The Masina family always welcomed visitors from this country, and their hospitality was genuine and sincere, as those who know India will understand. I shall always remember with gratitude the generous hospitality extended to me during a fortnight's stay at their hospital in 1943.

P. H. W.

THE LATE SIR BERNARD SPILSBURY

M. H. G. writes: Spilsbury's efficiency as a morbid anatomist is well illustrated by the following incident. To obtain material for the bacteriology class to learn the technique of preparing and staining films, a search was made through the hospital for samples of pus. Among those submitted was a specimen containing actinomyces from a case in which tuberculosis of the spine had been diagnosed. A few days later the patient died, and an autopsy was granted. It so happened that I visited the P.M. room on this occasion, and, although it was an hour after the usual time, found Spilsbury still working at a body which he had inverted on the table to examine the spine more thoroughly. I asked him the cause of the delay, and he replied: "The notes state that the lesion is tuberculosis of the spine, but I am convinced that it is not." Whereupon I asked him to turn the body over so that I could see the face: and sure enough it was the actinomycosis case. Few pathologists, I venture to think, would have perceived from the naked-eye appearance alone of the chronic inflammation and suppuration present that another factor than tubercle was involved. His histological investigations were equally thorough, and when asked in what proportion of cases he altered his view as to the cause of death as the result of them, he answered: "In approximately 60%." His outstanding services to the State in medicolegal cases were grossly underpaid; and surely it is time that the University of London established a chair in medicolegal medicine.

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An associate in the Medico-Legal Society writes: Bernard Spilsbury was one of the most truly modest and humble-minded men I have ever known. He never spoke of himself or his own achievement, and both hated and, so far as he possibly could, shunned the public notice which was inevitably thrust upon him. His complete absorption in his work was for the sake of the work itself and the advancement of the ends of justice and true knowledge, not for any personal distinction. What was to me one of his most striking characteristics as a medical witness was his great sense of fairness. His evidence was always directed not to the securing of a conviction but to the ascertainment of the truth and to the fulfilment of justice, and whenever anything was to be said in favour of an accused person one could be quite sure that Spilsbury would say it. The professions of both Medicine and Law will deplore his passing.

Diary of the Week

JAN. 4 TO 10

Sunday, 4th

LONDON JEWISH HOSPITAL MEDICAL SOCIETY
3 P.M. (Woburn House, W.C.1.) Mr. E. Chain, PH.D.: Chemical and Biological Properties of Antibiotics.

Monday, 5th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. C. Dee Shapland: Detachment of the Retina.

Tuesday, 6th

ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. R. D. Lawrence: Diabetes and Ophthalmology.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.1
5 P.M. Dr. I. Muende: Pathological demonstrations.

Wednesday, 7th

ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. W. J. B. Riddell: Analysis of Senile Cataract Distributions.
MEDICAL SOCIETY OF THE L.C.C. SERVICE
4.15 P.M. (County Hall, S.E.1.) Dr. R. C. Harkness: Medical Staff Problems in Municipal Hospitals.

Thursday, 8th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Brodie Hughes: Interpretation of Visual Field Defects.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. G. B. Dowling: Cutaneous Tuberculosis.

Friday, 9th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. B. W. Rycroft: Surgical Techniques of Corneal Transplantation.
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. J. Smart: Spontaneous Pneumothorax.
ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh
8 P.M. Mr. Hamilton Bailey: Physical Signs in Clinical Surgery.

Appointments

BICKERSTAFF, E. R., M.B. Birm.: registrar, neurological division, Birmingham United Hospital.
CLEMENT, LOUIS, M.R.C.S.: registrar in anæsthesia, Charing Cross Hospital, London.
COFFEY-KEATING, PAULINE, L.R.C.S.I., D.C.H.: asst. M.O.H. for maternity and child welfare, Huddersfield.
DAVIES, S. W., M.R.C.S., D.P.M.; school psychiatrist, Cornwall.
EASON, E. H., M.A., M.B. Camb.: asst. pathologist, Royal Northern Hospital, London.
JONES, T. B., M.R.C.S., D.P.M.: deputy medical superintendent, Royal Eastern Counties Institution, Colchester.
RAYNER, M. S.-M., M.A., M.B. Camb., D.P.M.: deputy medical superintendent, St. Andrew's Hospital, Thorpe, Norwich.
REITMANN, FRANCIS, M.D. Vienna, M.D. Pecs, D.P.M.: pathologist, Netherne Hospital, Coulsdon, Surrey.
SMEATON, W. G., M.B. St. And., D.P.H.: asst. M.O.H., Stockport.
WARIN, J. F., M.D. Leeds, D.P.H.: M.O.H. and school M.O., Oxford.
ZALESKI, MIROSLAW, M.D. Warsaw: asst. radiotherapist, Regional Radium Institute, Bradford.

University College Hospital, London:

APPLETON, J. H., M.B. Manc.: registrar, Royal Ear Hospital.
HARRIES, B. J., F.R.C.S.: surgical registrar.
WILLIS, AUDREY, M.B. Camb.: Hark Smith registrar, radiotherapy department.

Derby Group of Hospitals:

Asst. gynæcological and obstetrical surgeons:
JAMIESON, R. J. M., M.B. Belf., M.R.C.O.G.
PRITCHARD, J. G., M.B. Lpool, M.R.C.O.G.

North-East Scottish Region Orthopædic Service:

Asst. orthopædic surgeons:
HAY, GEORGE, M.B. Edin., F.R.C.S.E.
HENDRY, N. G. C., M.B. Aberd., F.R.C.S.E.

Notes and News

AN AMERICAN OUTLOOK

IT is not easy, perhaps, for Americans to realise the position in which the end of the war, and the abrupt termination of Lend-Lease, left this country. But if Americans are often out of touch with our point of view, we are at least as ignorant of theirs, and a little journal, *American Outlook*, cabled weekly from Washington,[1] shows how liberal is the attitude of many people in the United States towards our affairs, and how like, in some ways, are their everyday difficulties to ours. For instance the budget of a dermatologist aged 34, which is set out in a recent issue, shows that we share the burdens of heavy taxation, while their cost of (admittedly better) living far exceeds our own.

Last year the doctor earned over $15,000 (only 2·3 % of Americans have an income over $10,000 a year) of which over $3000 went in taxes, more than the joint earnings of him and his wife five years ago. Last year he bought a house for $14,500, spent $5200 on renovations and $3000 on furnishings. Despite his income he cannot afford to build a new house. He and his family eat well, spending $205 on food each month—more than the total income of some American families. Meat prices are now so high that turkey at 55 cents per lb. is their least expensive main course. The household—which includes a resident negro maid receiving $125 a month—uses 3 dozen fresh eggs weekly, a dozen quarts of milk and a pound of bacon. Their expenditure on clothes, alcohol, and tobacco is moderate, but they find it difficult to save more than $2000 a year, which is invested in a life-assurance annuity.

The doctor's wife, who feels unhappy to be eating so well when she reads of the diet in England or the real starvation in China, points out that reducing her family's meals would do the rest of us no good. "Only rationing could distribute the sacrifices equally," she says, "and my husband and I would not be sorry to see the return of rationing in the United States." They are disturbed by what they consider "profiteering and greed" in the United States, consider Great Britain to be "an outpost of democracy in Europe," and hope that Congress will advance further loans without conditions about the sort of Government we have, which, they believe, is not America's business. Though "somewhat more liberal," they think, than some of their friends and medical colleagues, they are opposed to a State health programme. The doctor thinks everything in the United States is now pitched at too lofty a level to be maintained, and he would like to see a slowing in the pace.

This, in short, is the picture of a family living through circumstances as queer in their way as ours, and bringing to their own and the world's difficulties fair judgment and a considering eye. As Lord Halifax suggested in his Montague Burton lecture[2]: if we can set aside our misconceptions of each other, English and Americans have much to share—a common tongue, a common heritage of history and literature, and interests which are fundamentally the same. In questions of frontiers, governments, human freedom, economic well-being, and security, he can see no large or necessary divergence between American and British interests.

CATALOGUE OF MEDICAL FILMS

THE Royal Society of Medicine and the Scientific Film Association are shortly publishing their promised catalogue of medical films,[3] and very welcome it will be. By March, 1946, over 1200 titles had been collected from published and private catalogues and lists held by commercial firms, medical societies, university departments, and private people; and it has since then been decided to publish this interim catalogue of 800 films which have been viewed. Dr. Brian Stanford, who has been responsible for compiling the catalogue, has himself seen 200 of the films and written a synopsis of each.

The first part of the catalogue has three sections: an alphabetical list of the 800 titles; a list of the titles arranged according to subject groups; and the titles indexed by catalogue number. The second part, in which Dr. Stanford gives full details of the 200 films he has seen, is intended to help with programme selection. The short accounts are vivid, giving a bold outline of the scheme of each film and indicating the type of audience for which it is intended.

The custody of all the material collected in manuscript and typescript has been entrusted to the care of the association, to whom inquiries for information not contained in the catalogue may be addressed at 34, Soho Square, London, W.1.

1. Obtainable from 15, King Street, London, W.C.2 (5 guineas per annum).
2. Delivered at the University of Leeds in February, 1947. Obtainable from the University Registrar. Pp. 12. 6*d*.
3. Obtainable after Jan. 31 from ASLIB, 52, Bloomsbury Street, London, W.C.1. 7*s*. 6*d*.

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AN ITALIAN REVIEW

A NEW Italian monthly review, consisting mainly of abstracts, of the latest advances in therapy throughout the world, *Therapeutica Nova*, began publication in July. It is arranged on the loose-leaf principle, each leaf being perforated with two holes 3 in. apart for fixing in a holder (presumably some standard size, for no holder appears to be supplied), and each subject bears a key number to facilitate filing. Each monthly number is enclosed in a loose cover. The annual subscription is 4400 lire for subscribers outside Italy, and the editor is Dr. Francesco Montuoro, of Milan.

University of Oxford

Lord Nuffield has given £50,000 to Lincoln College to set up three Nuffield (penicillin) research fellowships to commemorate the discovery of the chemotherapeutic properties of penicillin in the William Dunn school of pathology, whose director, Sir Howard Florey, F.R.S., is a fellow of the college. The fellowships will be awarded for research in science and allied medicine.

University of Durham

On Dec. 19 the following degrees were conferred:

M.B., B.S.—Anna Book, H. M. Brand, H. C. Brown, J. D. Brown, J. H. Grant, Brenda M. Hilton, A. R. Horler, A. A. Lawson, K. M. Martischnig, W. H. Raine, Alan Rounding, J. R. W. Sinton, Robert Whitfield, P. E. I. Winburn, K. M. Wood.

B.D.S.—C. H. Tonge, M.B.

University of Liverpool

At recent examinations the following were successful:

M.D.—S. Bender, D. M. I. Freeman, J. D. King, Teresa Lightbound, M. G. McEntegart, R. C. Nairn.

M.Ch. Orth.—H. G. A. Almond, G. S. Colvin, J. J. Commerell, M. D. Desai, J. Dickie, W. H. Fahrni, C. J. Kaplan, J. G. Kerr, H. K. Lucas, T. B. McMurray, B. F. Miller, N. H. Morgan, A. G. O'Malley, G. V. Osborne, W. Parke, B. Polonsky, T. Price, G. I. Roberts, V. R. Thayumanaswami.

M.B., Ch.B.—A. J. Borkin, H. C. Endbinder, W. P. Wilson.

University of Sheffield

Mr. S. R. Elsden, PH.D., has been appointed senior lecturer in microbiology in the department of bacteriology, Dr. R. O'Rahilly lecturer in anatomy, and Dr. J. L. Emery honorary lecturer in pathology.

University of Edinburgh

On Dec. 19 the following degrees were conferred:

M.D.—T. M. Abbas, A. W. Branwood,* F. S. Fiddes, S. L. Forrest, J. A. L. Gilbert,† J. W. Rae,* S. A. Rahman.‡

Ph.D. (in the Faculty of Medicine).—M. L. Bayoumi.

M.B., Ch.B.—A. MacD. Allan, H. W. Bisset, George Brown, Margaret W. Brown, Jean Buchanan, F. G. Cumming, I. H. P. Doherty, T. H. Donaldson, L. A. Gess, R. R. Gillies, Adair Girby, G. T. Graham, Janet Hazell, L. J. M. Jamieson, H. A. Jones, H. M. Kirkpatrick, F. E. Kohler, R. G. Krause, Marjorie V. Kydd, Anne M. McCartney, B. T. Mulligan, A. M. Nelson, W. H. Nisbet, Susan B. G. Ofori-Atta, J. G. Parish, A. G. B. Poole, A. D. Ross, Jean R. W. Ross, Kenneth Saltman, D. A. Smith, B. J. Spoule, Diana Stewart, Leila N. Wojtczak, L. L. D, Wood.

M.A.—Margaret W. Brown, M.B.

M.B., Ch.B. (of the Polish School of Medicine).—Jerzy Arendt, Stanislaw Goldberg,‡ Regina Goldstein,‡ Zbigniew Golen,‡ Józef Lomaz, Wanda Pilsudska,‡ Henryk Podlewski, Stanislaw Pogonowski, Wiktor Rosenberg,‡ Emanuel Wilder,‡ Mieczyslaw Wojciechowski.

* Commended. † Highly commended. ‡ In absence.

University of Glasgow

Dr. Stanley Alstead has been appointed to the regius chair of materia medica and therapeutics in succession to the late Prof. Noah Morris.

Dr. Alstead graduated M.B. at the University of Liverpool in 1929, taking his M.D. two years later. After holding house-appointments at the Royal Southern Hospital, Liverpool, and the Birmingham City Hospital, he was appointed, in 1932, to the Pollock lectureship in pharmacology and therapeutics at Glasgow University. Later he became physician to outpatients at the Western Infirmary, Glasgow, and assistant visiting physician at Stobhill Hospital. During the late war he served with the R.A.M.C. in the campaigns in Tunisia, Sicily, and Southern Italy, where he was mentioned in despatches. In 1944 he was in charge of a base hospital at Naples, and he also served in Belgium and Egypt, before he was demobilised in 1946 with the rank of lieut.-colonel. Last January he was appointed medical consultant in the North of Scotland under the Highlands and Islands Medical Service. Dr. Alstead has examined for the universities of Glasgow, St. Andrews, Durham, London, and Cairo. He has edited the last two editions of Poulsson's *Pharmacology and Therapeutics*, and his published work includes papers on the clinical aspects of pharmacology, such as the effect of chloral hydrate on the heart, potassium iodide and ipecacuanha as expectorants, ammonium salts in bronchitis, bismuth carbonate in gastric disease, and charcoal as a deodorant. He was elected to the fellowship of the Royal Faculty of Physicians and Surgeons in 1936 and of the Royal College of Physicians of London in 1945.

University of Leeds

Dr. G. Norman Myers has been appointed to the newly instituted post of director of research in rheumatism.

After holding a commission in the Durham Light Infantry during the 1914–18 war, Dr. Myers graduated B.SC. at the University of Durham in 1922 and took his medical degree there five years later. He also holds the degrees of M.SC. and PH.D., and he was awarded a gold medal for his M.D. thesis in 1930. From 1925 to 1929 he edited the *Durham College of Medicine Gazette*. After holding a resident appointment at the Royal Victoria Infirmary, Newcastle-on-Tyne, he was awarded a Beit fellowship in 1930, and later he became a research fellow and demonstrator in pharmacology in the laboratories of the University of Cambridge. He has also examined in pharmacology and therapeutics for the university, and he has acted as consulting physician in aero-research at Duxford. His published work includes papers on the influence of emulsions of oil upon the lethal effects of bacterial toxins, the effects of morphine upon the alimentary canal, and the pharmacological action of nikethamide. In 1931 he revised the 2nd edition of Cow's *Synopsis of Pharmacology*. Dr. Myers was elected F.R.C.P. in 1941.

Royal College of Physicians of London

A course of 26 postgraduate lectures in medicine will be given at the college from Feb. 2 to March 25. Further particulars will be found in our advertisement columns.

Royal College of Surgeons of Edinburgh

At a meeting of the college held on Dec. 17, with Mr. Frank Jardine, the president, in the chair, the following were admitted to the fellowship:

M. G. Allen-Mersh, M.S. Bengal, L.R.C.S.E., Nosrat Ameli, M.B. Birm., G. S. Anderson, M.B. Aberd., Una Aranha, M.D. Bombay, A. J. S. Burger, M.B. Cape Town, B. Z. Claman, M.D. Manitoba, T. R. B. Courtney, M.B. Melb., R. D. Cowan, M.D. West. Univ., Ontario, T. T. Davies, M.R.C.S., A. L. Deacon, M.B. Birm., J. L. Douglas, M.B. Glasg., William Drummond, M.B. Edin., G. E. Dunkerley, M.B. Lond., J. R. Elder, M.B. N.Z., C. D. Falconer, M.B. Edin., W. D. Giffen, M.B. Edin., J. S. Glennie, M.B. Aberd., J. T. Gray, M.B. Edin., L. M. Greene, M.D. Toronto, G. I. Henderson, M.B. St. And., N. G. C. Hendry, M.B. Aberd., Salomon Henson, M.B. Lpool, F. G. Hibbert, M.B. Manc., W. P. Hirsch, M.R.C.S., J. R. Hughes, M.B. Lpool, T. B. Hutton, M.R.C.S., H. B. Jackson, M.D. McGill, Isaac Jacobson, M.B. Cape Town, John Jankowitz, M.B. Witw'rsrand, J. H. Jordan, M.R.C.S., P. F. King, M.R.C.S., R. G. R. Langford, M.B. Cape Town, M. D. Leitch, M.B. Dubl., G. S. Lester, M.B. Birm., A. M. Loughran, M.B. Edin., Alec Lurie, M.B. Cape Town, W. A. McAlpine, M.D. Manitoba, J. N. W. McCagie, L.R.C.P.E., V. V. McCusker, M.B. Cape Town, Archibald McDougall, M.B. Glasg., J. A. Macfarlane, M.B. Edin., J. G. McFetridge, M.D. Manitoba, K. MacI. MacKenzie, M.B. Glasg., G. C. McKinlay, M.B. Glasg., L. A. H. McShine, M.R.C.S., W. A. W. Maney, L.R.C.P.E., M. J. Maxwell, M.B. Leeds, Leopold Mirkin, M.B. Cape Town, William Murdie, M.B. Edin., D. S. Murray, M.B. Edin., J. F. Neil, M.R.C.S., M. W. Paterson, M.B. Edin., R. H. Purnell, M.R.C.S., Balasubramaniam Ramamurthi, M.B. Madras, J. I. Rossman, M.D. Toronto, J. E. Rowlands, M.R.C.S., M. P. Shapiro, M.R.C.S., E. G. F. Shaw, M.R.C.S., R. H. Simpson, M.B. Glasg., S. R. Sinclair, M.B. Belf., M. S. Sindhu, M.B. Punjab, T. S. Stewart, M.B. Manc., C. R. Strother-Stewart, M.B. Edin., S. D. Stock, M.R.C.S., I. S. D. Thomson, M.B. Edin., J. D. Thomson, M.B. Glasg., A. K. Toufeeq, M.B. Wales, W. A. L. Tucker, L.R.C.P.E., H. P. Watson, M.B. St. And., A. L. Webster, M.B. St. And., T. B. Whiston, M.B. Edin., G. W. Wigg, M.R.C.S., H. W. G. Williams, M.R.C.S., H. O. Williams, M.B. Lpool, J. E. Wilson, M.B. Durh., H. C. Worrall, M.B. Edin., Margaret P. Yeoman, M.B. Edin., G. B. Young, M.B. Edin., I. S. Young, M.B. Glasg., Harold Zalin, M.B. Lpool.

Society of Apothecaries of London

Prof. E. C. Dodds, F.R.S., the master, took the chair at meetings of the court of assistants on Oct. 28 and Dec. 16—the latter being the 330th anniversary of the first meeting of the court. He conferred past masters' medals upon Dr. J. Prescott Hedley and Dr. Hugh Powell. Dr. Archibald Gilpin was appointed archivist in succession to the late Dr. Cecil Wall. The following were sworn-in as examiners: Mr. A. C. H. Bell (mastery of midwifery) and Prof. Samson Wright (physiology).

Sir Alfred Webb-Johnson, P.R.C.S., was clothed by the master with the livery of the society. P. R. R. Clarke was admitted to the freedom of the society by servitude. The following were admitted to the freedom by redemptions: D. W. Kent-Jones, Franklin Bicknell, C. S. Gibson, S. W. Southwood.

The diploma M.M.S.A. was granted upon examination to A. M. Michaelowsky, and the diploma L.M.S.S.A. to the following:

J. N. Phillips, H. R. Mohammed, F. A. R. Bateman, H. Burns-Price, A. A. Collis, M. E. Cowan, J. M. Cowan, G. R. Davies, R. Worsley, R. J. Helyer, D. M. H. Bickmore, D. G. Buchanan, J. C. Bradley, P. Benham, D. G. Walworth-Furness, J. M. Scott, K. Y. Khong, D. M. Strange, E. Wales, C. J. Burrows, H. S. Baar.

Proposals for Health Centres

In a circular to local authorities (176/47) the Minister of Health cancelled Dec. 31, 1947, as the last date for the submission of proposals under section 21 of the National Health Service Act (see *Lancet*, 1947, i, 894). A further circular on health centres is to be issued shortly.

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Ella Sachs Plotz Foundation

During the 24th year of this foundation for the advancement of scientific investigation, 52 applications for grants were received of which 21 came from the United States and the remainder from thirteen different countries in Europe, Asia, North and South America. Altogether 26 grants were made during the year.

Grants are made to researches in medicine and surgery. They may be used for the purchase of apparatus and supplies for special investigations, and for the payment of unusual expenses incident to such investigations, including technical assistance, but not for providing apparatus or materials which are ordinarily a part of laboratory equipment. Stipends for the support of investigators will be granted only under exceptional circumstances.

The maximum grant will usually be less than $500, and applications for the year 1948–49 should be sent before April 15 to Dr. Joseph C. Aub, Massachusetts General Hospital, Fruit Street, Boston 14, Mass., U.S.A.

Liverpool Heart Hospital

The inpatient department of this hospital is to be transferred to Caldy Manor. The outpatient department will remain at the present premises in Oxford Street, Liverpool.

Royal Sanitary Institute

At a meeting of the institute, to be held at the town hall, Colchester, on Wednesday, Jan. 21, at 2 P.M. Dr. J. D. Kershaw will speak on the Implementation of the Nationa Health Service Act in County Districts.

St. George's Hospital, London

Dr. Anthony Feiling and Dr. Desmond Curran are giving a course of neurological and psychiatric demonstrations on Thursdays, at 4.30 P.M., till March 18.

Society of Public Analysts and Other Analytical Chemists

A joint meeting of the physical methods and biological methods groups of this society will be held at 1, Wimpole Street, London, W.1, on Thursday, Jan. 29, at 2.30 P.M., to discuss methods of penicillin assay. Doctors who are interested are invited to attend.

Institute of Child Health

The court and senate of London University have approved the acceptance of an anonymous gift of £5000 to establish an Alex Simpson-Smith lectureship at the Institute at the Hospital for Sick Children, Great Ormond Street, in memory of a former surgeon to the hospital who lost his life while serving in the R.A.M.C. in North Africa in 1942.

Rowley Bristow Orthopædic Hospital

The committee of the Waifs and Strays, now called the Church of England Children's Society, have decided to rename St. Nicholas' and St. Martin's Hospital for Crippled Children, which they founded, the "Rowley Bristow Orthopædic Hospital," as an appreciation of Mr. W. Rowley Bristow's long and brilliant services to the institution.

Award for Work on Blood-transfusion

The committee of the Oliver Memorial Fund intend to make the first award, of £50, to a British subject whose original work is considered to have contributed most to the subject of blood-transfusion during the past five years. Applications should reach Mr. F. W. Mills, National Provincial Bank Ltd., Holborn Circus, London, E.C.1, by Feb. 29.

Interamerican Cardiological Congress

The Interamerican Society of Cardiology has authorised the meeting of the third Interamerican Cardiological Congress, to be held in Chicago from June 13 to 17. This meeting will take place immediately before the annual meeting of the American Heart Association on June 18 and 19, and the meeting of the American Medical Association in the week of June 20. Inquiries may be addressed to the congress offices, at the Michael Reese Hospital, Chicago, Illinois.

Regional Hospital Boards

Sheffield—Dr. J. G. McCrie, dean of the faculty of medicine of the University of Sheffield, has been appointed to the board in place of Prof. E. J. Wayne who has resigned.

Northern (Scotland)—Dr. Thomas Scott, who is a member of this board, is a consultant physician under the Highlands and Islands Medical Service.

Oxford—Prof. H. J. Seddon has resigned owing to pressure of work.

W.H.O. News

Yugoslavia was the 17th member of the United Nations to ratify the constitution of the World Health Organisation; she has also ratified the protocol concerning the Office International d'Hygiène Publique. The constitution has now been accepted by 24 nations, of which 7 are not members of the United Nations.

W.H.O. fellowships were granted to 190 physicians, nurses, and public-health specialists during the first eleven months of 1947. Of these, 97 were made for study in the United States and Canada, and 91 for work in Europe, Great Britain, and the U.S.S.R. Fellows are nominated by their governments and follow a plan of study approved jointly by the national government and W.H.O.

Penicillin has been released from export licensing control.

Tubercle is now the official organ of the Tuberculosis Association.

Over 17,500 doctors and 16,000 nurses have attended 506 showings of the Ministry of Health's film on the early diagnosis of acute anterior poliomyelitis.

Births, Marriages, and Deaths

BIRTHS

BINTCLIFFE.— On Dec. 19, the wife of Lieut.-Colonel E. W. Bintcliffe, M.B.E., F.R.C.S.—a son.
BURGEN.—On Dec. 19, in London, the wife of Dr. Arnold Burgen—a son.
GRANT.—On Dec. 25, in London, the wife of Dr. R. N. R. Grant—a son.
HALLIDAY.—On Dec. 21, at Derby, the wife of Dr. J. H. G. Halliday—a daughter.
JEFFERSON.—On Dec. 16, at Oxford, the wife of Dr. Michael Jefferson—a son.
LAURIE.—On Dec. 17, at Cardiff, the wife of Lieut.-Colonel William Laurie, D.S.O., I.M.S.—a son.
MILNE.—On Dec. 23, the wife of Dr. Keith Milne—a son.
ROSS.—On Dec. 18, the wife of Dr. K. M. Ross—a son.
SCOTT.—On Dec. 25, the wife of Mr. G. I. Scott, F.R.C.S.E.—a son.
SCOTT.—On Dec. 23, at Norwich, the wife of Dr. R. H. Scott—a daughter.
SNELL.—On Dec. 17, in London, the wife of Dr. W. E. Snell—a son.
SUCKLING.—On Dec. 20, at St. Albans, the wife of Dr. Peter Suckling—a daughter.
WATKINS-PITCHFORD.—On Dec. 19, in London, the wife of Dr. John Watkins-Pitchford—a son.

MARRIAGES

ELLIS—HEAD.—On Dec. 17, at Nottingham, John Matthew Ellis, M.R.C.S., to Evelyn Mary Head (née Ford).
JONES—WALTERS.—On Dec. 20, at Dudley, Ian Sutherland Midsom Jones, M.B., to Gwendolyn Walters.
LESLIE—BRAITHWAITE.—On Dec. 20, at Harrogate, Gilbert Frank Leslie to Mary Braithwaite, M.D.
MILLER—DONOHUE.—On Dec. 19, in London, Thomas Finlayson Miller, F.R.C.S., to Elizabeth Mary Donohue.
ROGERS—ALDRICH.—On Dec. 15, in London, Stephen Clifford Rogers, M.B., to Rosamond Aldrich.
THOMS—DUNCAN-JONES.—On Dec. 20, at Chichester, Geoffrey Surridge Thoms, surgeon commander, R.N., to Ursula Elizabeth Duncan-Jones.

DEATHS

BEATTY.—On Dec. 24, Robert Moorhead Beatty, B.A., M.B. R.U.I., aged 82.
BROUGHTON-ALCOCK.—On Dec. 23, in London, William Broughton-Alcock, B.A., M.B. Camb.
COLLINS.—On Dec. 23, Henry Warner Collins, B.SC. Lond., M.D. Lausanne, D.M.R.E., barrister-at-law.
INGRAM.—On Dec. 20, at Bournemouth, Arthur Charles Ingram, M.D. Camb., M.R.C.P., D.P.H.
JOHNS.— On Dec. 23, at Cheltenham, John Francis Johns, M.D. Durh., D.P.H.
JOHNSTONE.—On Dec. 20, in London, Frederick John Carlyle Johnstone, M.D. Edin., D.P.H., D.T.M.
JONES.—On Dec. 22, Herbert Saunders Wansbrough Jones, M.B. Edin.
MASINA.—On Dec. 17, in Bombay, Ardeshir Hormasji Masina, M.D. Camb., M.R.C.P., aged 36.
MITCHELL.—On Dec. 18, John Malcolm Lamont Mitchell, M.B. Glasg.
PILCHER.—On Dec. 26, at Ashstead, Surrey, Edgar Montagu Pilcher, C.B., C.B.E., D.S.O., M.B. Camb., F.R.C.S., major-general, late R.A.M.C., aged 82.
RAMSDEN.—On Dec. 23, at Oldham, Herbert Ramsden, M.D. Lond.
ROBSON.—On Dec. 19, at Inverness, Briton Smallman Robson, surgeon captain, R.N. retd.
SEALY.—On Dec. 18, at Chardstock, Humfrey Newnham Sealy, B.A. Camb., M.R.C.S., colonel, late R.A.M.C., aged 60.
SHELDON.—On Dec. 25, Arthur Izod Sheldon, surgeon captain, R.N.
STEBBING.—On Dec. 22, in London, George French Stebbing, M.B. Lond., F.R.C.S., F.F.R.
WATSON.—On Dec. 24, at Birkenhead, James Watson, M.B. Glasg., formerly of Nottingham, aged 84.

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"*Iodine and Failing Lactation*," BRITISH MEDICAL JOURNAL, *July 26, 1947, v. ii, pp. 126-128.*

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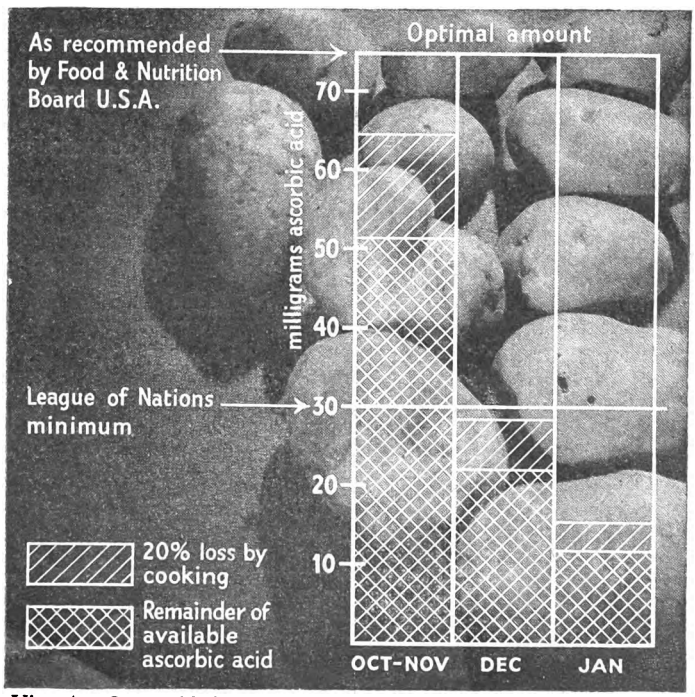

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(*The Lancet*, Nov. 15, 1947, p. 730).

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British Medical Journal, June 30th, 1945, p. 926.

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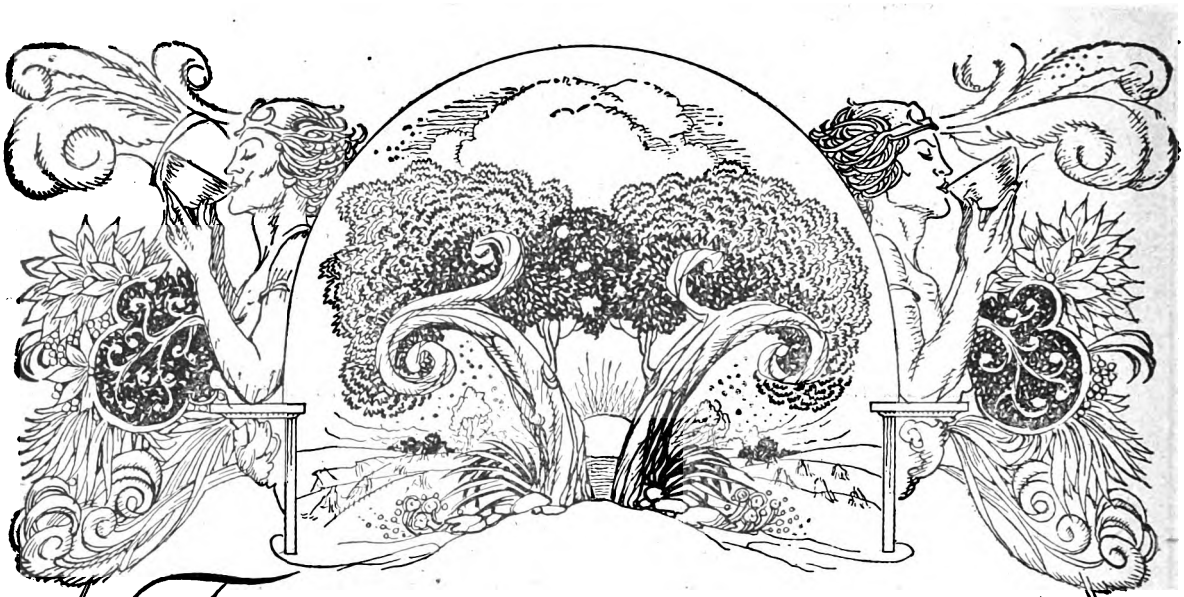

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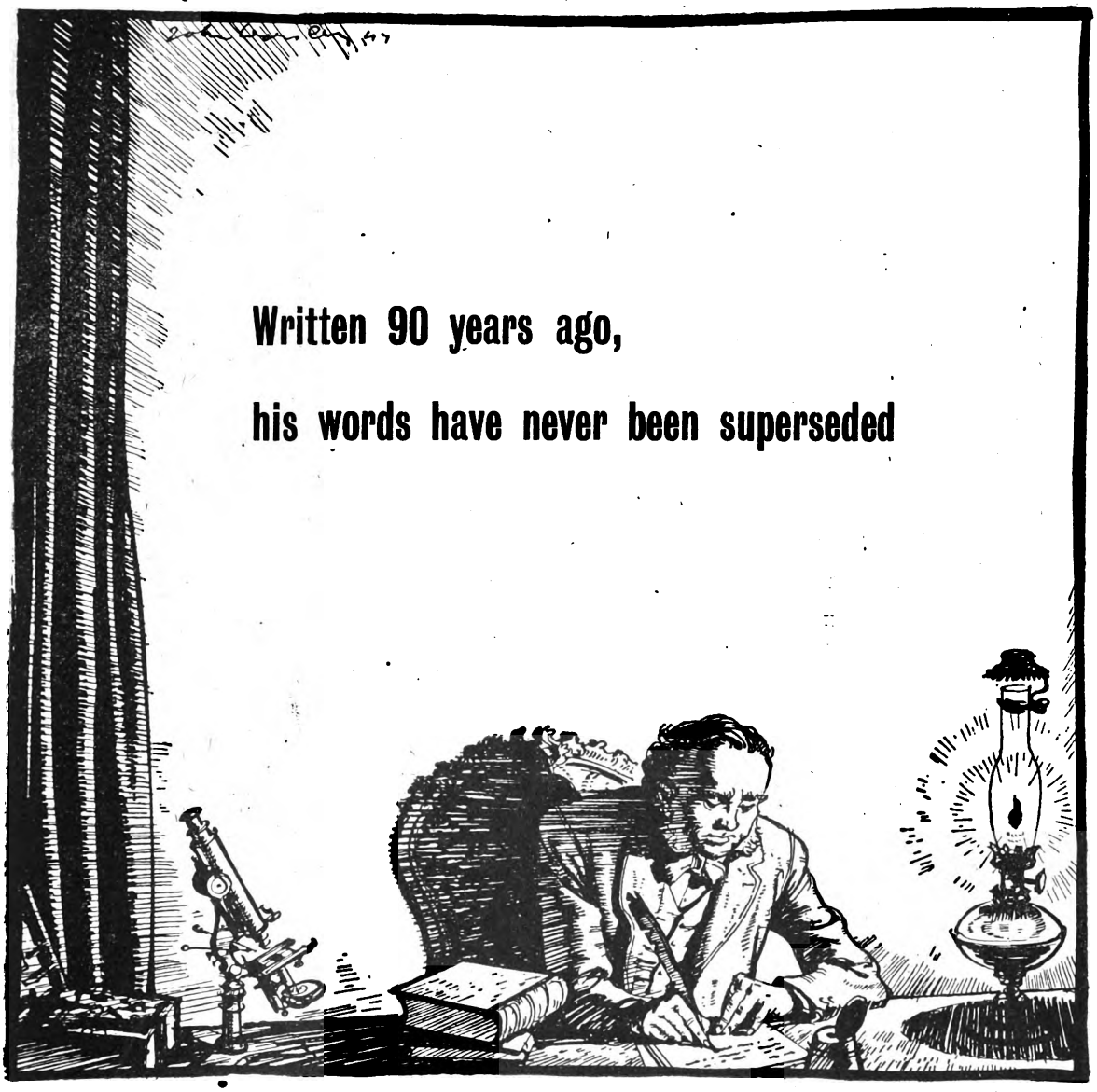

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THE PSYCHOLOGICAL ASPECTS OF SANATORIUM MANAGEMENT

G. S. TODD
C.V.O., O.B.E., M.B. Sydney, F.R.C.P.
MEDICAL SUPERINTENDENT, MIDHURST SANATORIUM

E. WITTKOWER
M.D. Berlin
PSYCHIATRIC RESEARCH FELLOW, NATIONAL ASSOCIATION FOR THE PREVENTION OF TUBERCULOSIS; PHYSICIAN, TAVISTOCK CLINIC; PSYCHIATRIST, DERMATOLOGICAL DEPARTMENT, ST. BARTHOLOMEW'S HOSPITAL, LONDON

SANATORIA for tuberculous patients serve four main aims: (1) restoration of the patients' health so far as possible by surgical and medical measures; (2) adjustment of patients to a new mode of life; (3) testing of their ability to stand up to strain; and (4) segregation of potential sources of infection from a non-infected, or at least not manifestly ill, community.

Emphasis on any of these four aims varies from sanatorium to sanatorium, but it is generally agreed that, apart from surgical measures, which assume an ever-increasing importance, to teach patients a new mode of life is one of the main functions of a sanatorium. To achieve this is a matter of management, which, to be effective, requires understanding of the persons concerned and their state of mind in relation to their social environment. We therefore deal here with the state of mind of the tuberculous patient, the effect of sanatorium life, the principles of management employed, and the procedures of management suggested.

STATE OF MIND OF TUBERCULOUS PATIENT

Constructive Resignation and Indifference.—Tuberculosis is not a disease which any person who realises its full significance accepts with equanimity. If they do, patients are either of a carefree temperament, or their lesion is of a minor nature with very few general effects. Resignation must be separated from the drifting observable in some sanatorium patients, and from indifference which arises in mental defectives.

Depression and Anxiety.—Most patients with tuberculosis are in a mood of mild overt or concealed depression and anxiety. They have reason enough to be depressed and anxious, because, even at the very best, a considerable slice has been taken out of their active lives; not infrequently their hopes and aspirations have been dashed, their financial situation may be precarious, and their immediate and distant future is still very much in the balance. Mild anxiety and depression are normal and adequate reactions to an insidious disease such as tuberculosis. Offsprings of these reactions and defences against them are defiance and, strange though it may appear, ultra-cheerfulness.

Defiance and Ultra-cheerfulness.—Rather than give in to despondency and decry their fate, some patients kick against it and put up a bold front which may be impressive. It *is* a front because behind it they harbour the same fears as do their apparently less courageous fellow sufferers. These are the patients who carry on at work until their lesion is far advanced; as bed-patients they are often restless and anxious to get up at an early date. Their overactivity is based on a severe sense of obligations towards their dependants; on an over-severe social conscience; on inability to accept dependence; and on the superstitious belief that, once they give in, the illness will get the better of them. Ultra-cheerfulness, on the other hand, may show itself in the form of a false jocularity and in an unwarranted hope for a speedy recovery. These patients tend to make light of their complaint; they pin their hopes on some miraculous drug and express altogether an optimism with little or no foundation. As sanatorium patients they joke with the nurses in a facetious manner, talk rot for the sake of saying something, drink on the quiet, and find the female patients very charming. The true spes phthisica of textbooks is rare. Minor degrees of it are fairly common. In advanced cases it may be due to a euphoria of toxic origin; more often than not it is due to psychological mechanisms similar to those operative in many war-time sayings. "A bomb will only hit me if my name is on it," we used to say, warding off the possibility and fear of death.

Resentment and Apathy.—All of us, if we feel rotten and cannot do or get what we want, become bad-tempered. In chronic illness our self-interest becomes abnormally inflated; hence many tuberculous patients are extremely touchy about real or imagined slips made by the nurses and may be very awkward from the nursing point of view. Some of them are disgruntled and very troublesome; their doctors and nurses are no good, in their opinion, and "the grub" is absolutely shocking in the sanatorium; they do what they like during rest hours and do not care about rules and regulations. Apathy is rare in tuberculous patients. It occurs occasionally in early and in advanced stages and represents, if not of toxic origin, a withdrawal from an otherwise unbearable situation.

Whether or not a patient develops one or other of these reactions, and to what degree, depends on a multitude of factors, such as prominence of symptoms, severity and duration of illness, stage of treatment, field of observation, financial, occupational, social, and domestic repercussions of the disease, and (last but not least) the patient's previous personality and his life situation previous to the onset of the complaint. More often than is generally known, severe emotional conflicts precede the onset of the illness, and assume, to all appearances, a precipitating function. For some patients the advent of the illness and admission to a sanatorium constitute a temporary, though unsatisfactory, solution of their pressing problems, whereas others continue to worry about them even at the sanatorium.

EFFECTS OF SANATORIUM LIFE

With admission to a sanatorium tuberculous patients exchange one world for another. In this new world they live in a community of fellow sufferers and are well looked after medically, and many of their worries have been left behind. However, they are debarred from normal community life for an indefinite period, tied down to their beds to begin with, and isolated to some extent from those who are dear to them, owing to the inaccessibility of most sanatoria. There are many factors in sanatorium life which may tax their morale to a breaking-point.

Mood

The company of others who are in the same position is certainly a great consolation because it does away with the feeling of being one of the few unlucky ones. Moreover, the spectacle of others being up and about, or leaving the sanatorium in high spirits, has a cheering effect on the remainder, unless they are very ill.

But by coming into a sanatorium a patient also gives up his privileged position at home and joins the ranks of the many who share his fate. Perhaps for the first time the newcomer becomes familiar, usually through other patients, with the various operations which he may have to undergo, with the possibilities of complications, and with the doubtful curability of his complaint. "Once T.B.," some of the patients say, "always T.B." As a result of anxiety about their own condition many sanatorium patients are apt to compare notes (not always to their advantage), to talk incessantly about their complaint, and to frighten newcomers by telling them

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gruesome tales. There is no worse menace than the patient with a little knowledge who pretends to be an expert in the treatment of pulmonary tuberculosis and who visits new patients explaining how, in his opinion, they should not be treated to achieve the speediest recovery.

However, the Jeremiahs and Jobs do not have it all their own way. They soon learn to their bitter cost that people laugh with those who laugh, whereas those who cry soon cry alone. Similarly, a ward of high morale exerts a restraining effect on the grouser. Only if the morale of a sanatorium or of a ward is low are complaints about alleged mismanagement likely to gain ground.

Dependence

As long as he is confined to bed, the tuberculous patient is dependent for all his needs on the attention of nurses. He is told what he has got to do and what he should not do, and if he is "naughty" he must expect to get into trouble. Nurses, for some reason or other, seem to have a preference for nursery expressions, and some of them, anyway, seem to delight in ordering patients about. Willy-nilly, once again the patient finds himself in the position of a child. Some of them rather like to be mothered, whereas others resent being treated as children.

In addition, from the moment he enters the sanatorium a patient places his fate in the hands of his doctors. No longer does he shoulder any responsibility for himself; but, for good or evil, his future depends on his doctors' good will, skill, knowledge, and wisdom. No wonder that many patients turn to their doctors with blind and almost childlike faith, and attribute to them powers which, unfortunately, they do not and cannot possess.

But tuberculous patients are not long in a state of complete dependence. In fact, one of their main difficulties is that they often feel well and yet must not exert themselves. As they get up and about—and sometimes earlier—some of them shake off their sense of dependence. Well known is the patient who, even while kept in bed, tries hard to use his enforced idleness in a constructive manner. Others, especially in sanatoria with no organised occupational therapy, completely surrender to dependence and fail to give it up even after they have left the sanatorium.

Interests

In the face of temptation to do otherwise, some patients assert themselves to a remarkable extent under sanatorium conditions. They use their time profitably, broaden and deepen their interests, and leave the sanatorium altogether enriched by their new experience. More often than not, however, if not effectively counteracted, the interests of sanatorium patients become narrowed. Their life is so monotonous, the routine of one day is so exactly like that of another, that they lose count of time, and time for them loses its value. Owing partly to their complaint and partly to sanatorium conditions they are apt to live for the day and to slip into a state of empty drifting. But that does not mean that sanatorium life is dull and boring for them. On the contrary, sanatorium patients keep themselves very busy; but, if one adds up what they have really done during a day, it amounts to practically nothing. The story is told of a bed-patient who was put "on hours" by his doctor, and who, after a look at his appointment book, said that he was sorry but he could not fit it in.

Just as in any other small community miles away from anywhere, rumours travel fast in a sanatorium and gossip usually flourishes. As the affairs of the world outside gradually fade into insignificance, minor events in the small sanatorium world—a new doctor, a harsh word from a nurse, a squabble with a fellow patient, and a flirtation between a male and a female patient—are magnified out of proportion, and any break in the humdrum routine, such as meals, assumes disproportionate importance.

Childishness

Regimented community life tends to make people behave childishly. This effect is intensified if the regimented community consists of people who, by reason of a chronic illness, have undergone a process of regression. Hence it is not really surprising that a fair number of patients under sanatorium conditions behave in a manner out of keeping with their age and with their previous conduct, such as indulging in pillow-fights, making apple-pie beds, hiding pyjamas, or pouring mustard into a fellow patient's cocoa. Apart from those mentioned, various other factors may be responsible for this change—e.g., the removal from the accustomed and restraining home environment, the segregation of the sexes at many sanatoria, and the patronising attitude of many doctors and nurses towards their patients. Some patients seem to think that, because responsibility has been lifted off their shoulders, they must act irresponsibly, or because they are treated like children they should behave as such. Usually these pranks are perfectly harmless; but, if they are dealt with in a schoolmasterly fashion, matters only become worse.

Sex

There is no evidence for the assertion that tuberculosis stimulates people sexually. True it is that, like anybody else who has had a very unfortunate experience, a tuberculous patient, because of understandable self-pity, feels in need of affection. If his girl sticks to him it helps him a great deal; but if she deserts him owing to his complaint it hurts him very deeply. A female patient in her late twenties asks herself, with some justification, whether she will be left on the shelf. At any rate, men and women alike feel that their social value has been impaired by their illness and that they are no longer as lovable or attractive to the opposite sex as they were previously; quite naturally they want to be reassured on these points.

Let us assume that patients with thoughts and feelings of this kind are admitted to a sanatorium. Perhaps it is the first time that they have been away from the close supervision of their parents or from the shackles of married life. Youth is so very short, and it is not very pleasant to spend the best years of one's life in the cloistered atmosphere of a sanatorium. Is it not understandable that, in these circumstances, they look out for a companion, significantly called a "mingle," with whom they can strike up a friendship? Usually these affairs come to nothing, because as soon as the patient has left the sanatorium he wants to forget all about it. Yet some sanatoria insist on strict segregation of the sexes. A girl is expected to pass by demurely a boy with whom she would like to have a chat, and a boy is not allowed to say good morning to a girl to whom he would like to say much more. Besides, though the company of members of one's own sex is quite agreeable, one would like sometimes to get away from them. Consequently a youth in his early twenties, out of sheer devilment or to spite the authorities, will fix an appointment; and the very fact that one has to take the risk of being expelled adds an extra kick to the stealthy rendezvous in Mingle Wood.

Patients talk a great deal about these things, among themselves and to anybody who wants to know. Least is said about them in sanatoria in which free social intercourse is permitted between both sexes, but considerably more in sanatoria in which association between men and women is prohibited, or in sanatoria for one sex. In many ways the situation of patients in these sanatoria is similar to that of soldiers in barracks, with the difference that a soldier meets his girl friend in off-duty hours, whereas the patient is debarred from contact with the opposite sex for an indefinite period.

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Community Ties

To some extent sanatorium patients belong to two communities—their home and the sanatorium. Visitors and the avidly awaited and much cherished mail constitute the link between both worlds; the only other means of communication with the outside world are the wireless and the newspapers. In the beginning, and if their stay is comparatively short, their allegiance is not really in doubt, because they live from one visiting-day to another. But after a while, if they are allowed to go on leave, they find the pace outside frightening, their rooms at home small and stuffy; they miss the routine to which they have become accustomed, and they sometimes notice that they have become indecisive, because at the sanatorium all the decisions had been made for them; not infrequently they are quite glad to go back to the sanatorium when their time is up. There, at least, they feel safe and secure and geographically removed from a scene which may present demands and worries. As the months elapse, they develop friendships with their fellow patients and eventually, especially if sanatorium conditions are pleasant, they may become so engulfed and absorbed by sanatorium life that their feeling of joy over going home may be tempered by fear of leaving a secure shelter when the day of their departure arrives.

METHODS OF SANATORIUM MANAGEMENT

Sanatorium superintendents deal with this complex situation in two contrasting ways, autocratic and democratic.

Autocratic.—Exponents of the autocratic sanatorium régime start off from the conception that they know best what is good for their patients. Consequently they design a drill in the very best interests of their patients which they enforce rigidly, acting on the principle "Take it or leave it." And leave the patients must, and at short notice, if they infringe any of the rules and regulations. By imposing a very rigid discipline doctors in these sanatoria hope to induce their patients, when they leave the sanatoria, to carry on automatically the routine which they have learned. Anyway, they argue, without strict discipline chaotic conditions would ensue. Patients in sanatoria of this type are deliberately left in the dark about their condition, on the grounds that their standard of intelligence is usually much too low for them to understand what it is all about, and that, even if they were told, they would only get hold of the wrong end of the stick, and that it would be unwise to worry them. In some of these sanatoria patients are not allowed to discuss tuberculosis or read books about it. Nurses are expected to fall into line with the principles of the régime. Their job is to see that the doctors' instructions are carried out, and that the patients conduct themselves in a proper manner. In particular, conversing of nurses with patients, regarded as "fratting," is discouraged by the authorities. Superintendents of sanatoria of this type likewise disapprove of social contact between male and female patients, because it may lead to unpleasantness from the viewpoints both of the patients and of the sanatoria.

Democratic.—Against this, adherents of a democratic sanatorium régime hold the view that tuberculous patients have come to a sanatorium through no fault of their own; and, this being so, one might as well make their stay as pleasant as can be. They regard self-imposed discipline as preferable to imposed authority, and try to bring it about by explanation of reasons for sanatorium rules, which are reduced to the essential minima. Superintendents of sanatoria of this type believe that a patient treated as an adult will behave as such, and that a patient enlightened about his condition is better prepared for the time after his discharge than one who has only carried out a drill. For instance, a patient who has really understood the nature of his complaint, the reasons why he has to take things easy and why he has to take certain precautionary measures, is much less likely to act against his own health interests and those of others than a patient who has been subject to "imposed authority" without explanation of the whys and wherefores. Male and female patients in these sanatoria are allowed to associate freely, according to all accounts, without untoward results.

PROCEDURES OF MANAGEMENT SUGGESTED

On the basis of many years of experience as superintendent of a sanatorium (G. S. T.), and on the basis of experience gained by visits to various sanatoria (E. W.), we have reached certain views on some procedures of sanatorium management.

First Approach

Though most doctors deal with their patients very tactfully, some are unnecessarily blunt and others anxiously overkind. The practice of telling a patient that he will be all right in three months' time does more harm than good. When the truth comes out, it shatters the patient's confidence in his recovery and in his doctor's word. Because uncertainty is very worrying, most patients are grateful if some indication can be given to them about the presumable length of their stay at the sanatorium.

Knowledge about Disease

Leaders of industry and of the Army have long realised that, to ensure willing coöperation, it pays to take subordinates into their confidence. Medicine still lags behind. Many doctors still pose as omnipotent, or treat their patients as if they are not old enough to understand what is the matter with them. Many patients resent being left in the dark about their condition, and obtain information (often inaccurate) elsewhere. Similarly, false encouragement defeats its object and leads only to distrust and suspicion. If one picks one's patients carefully, much can be gained by a frank explanation of their ups and downs. Explanatory talks on tuberculosis and the uses of a sanatorium, and a feature, "Any Questions?" run at some sanatoria, have been an outstanding success. Only in the case of a patient who is irrevocably going downhill is adherence to the truth usually out of place.

Doctor-Patient Rapport

There seems to be a division at many sanatoria between the work of the doctors and that of almoners. The doctors look after the patients' lungs, and the almoners after their worries; as if it were possible to make a sharp division between body and mind. Tuberculous patients want to talk; but medical superintendents who rule their kingdom from their office, or go on their rounds with a trail of students and nurses, do not give them a chance to do so. In our opinion it is essential for the medical superintendent to meet the patients alone quite often, if he is to give them their best chance. There is very little doubt that due regard to the patients' personalities, their life situation before the onset of their complaint, and their emotional situation afterwards, would speed up their recovery and, incidentally, the turnover of the sanatoria. Only in a limited number of cases should expert advice be required.

Types of Patients

Conscientious altruistic types require different handling from selfish self-centred types. The former should be encouraged to do less than their severe social sense allows them, and the latter to do more than their fear of reverses lets them.

Types of Reaction

During the initial stages patients should be allowed to experience feelings of depression and to pass through a

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phase of it without much interference; for, after all, they have good reason to feel depressed. Nobody can seriously believe that a "cheer-up-ol'-man" approach to a patient, or well-meant advice that he should pull himself together or that he should not worry, can influence his state of mind in any way. Similarly, anxious patients who frantically try to conceal their anxiety should be tactfully encouraged to admit their fears without feelings of shame. By condoning it the chest specialist helps his patients to tolerate their anxiety and thereby eases their emotional tension. Afterwards, with the proviso made above, the aim all along should be to induce a patient to make a realistic assessment of his situation which may be equally remote from the fool's paradise of the patient who underrates the seriousness of his illness as from the inferno of his depressive counterpart who overrates it. Ill-founded reassurance defeats its object in the long run; nor is encouragement of an over-complacent or a defiant attitude in the real interest of the patients.

Nurses

Complaining about the laziness of her patients, a nurse said that in her opinion they were absolutely fit—apart from tuberculosis. Unless lectures on tuberculosis and on the value of the nurse in the general treatment of the case are given to them, one cannot expect nurses to show understanding for their patients; nor can one expect them to handle their patients intelligently.

Many nurses are genuinely interested in their patients as human beings and are puzzled by behaviour problems which they present. However, because of thoughtlessness partly, and partly because of lack of training in matters of elementary psychology, nurses leave much to be desired so far as the psychological handling of patients is concerned. Nursing of the tuberculous is not always very interesting; it is felt that it could be made much more interesting for nurses if the human factor could be introduced into their training.

Changing of Nurses

Patients not infrequently unburden themselves more readily to the nurse than to the doctor. For this reason and many others close coöperation between doctors and nurses and continuity of staff should be aimed at. Though it is fully realised that, in view of the present shortage of nurses, the changing over of nurses from one ward to another is unavoidable, this should be reduced to a minimum.

Absolute Rest

If this is to be effective, the patient must lie flat in bed with only one pillow, and must not wash or feed himself, and all conveniences must be brought to the bedside. It is impossible, in every type of patient, to carry out this treatment for any great length of time. Only if a case is likely to deteriorate otherwise should it be enforced for longer than a month. In most cases, such as those of artificial pneumothorax or other collapse therapy, one week of absolute rest should suffice, and be followed if necessary by a modified system which might allow washing, reading, and (for women) a little knitting.

Bedroom Amenities

It has been the general rule in many sanatoria to make the wards, rooms, or cubicles as austere as possible, owing to fear of infection from the dust which always collects on furniture and on patients' knick-knacks. But the patient's room is his home, often for many months, and an endeavour should be made to make it as much like home as is compatible with good treatment. Wireless earphones should be present in every room, so that the patients can hear not only programmes of their own choice but also broadcasts and lectures given by members of the staff through microphones. Listening to the wireless should be permitted during rest hours; for there is far less exertion in lying flat with a pair of earphones on than in other activities commonly indulged in against regulations, such as writing letters or mending clothes.

Compatibility of Neighbours

Care should be taken to ensure the compatibility of bed neighbours. Age, intelligence, interests, habits, stage of the disease, and attitude towards it are factors which should be taken into account. Whenever necessary, changes should be effected in compliance with the wishes and in the interest of the patients.

Food

Variety of food is essential. The practice of some sanatoria of having fixed menus on certain days of the week deprives the patient of the element of surprise and leads to much discontent. It goes without saying that meals should be tempting and served hot. Supervision of the food from the buying to the serving is obviously too much for most matrons in view of their many duties. Sanatoria would be well advised to employ a catering expert.

Smoking and Drinking

Patients who smoke should do so with moderation. Those with laryngeal disease should be strictly forbidden to smoke, but no harm can come to the ordinary type of patient by allowing a maximum of five cigarettes, or two pipefuls of tobacco, daily. Alcohol in strict moderation is not harmful to the ordinary patient under treatment, but it is wise to forbid its use in sanatoria because patients are apt to form a habit of collecting in groups and having a drink to make the conversation more convivial.

Outside Contacts

Visitors should be allowed as often as is compatible with the treatment. Restriction of visiting-days to once a week or once a fortnight constitutes an unnecessary hardship and is not in the interest of the treatment. Three visiting-days a week should not be considered to be too much.

As a general rule, however, children under 14 years of age should not visit in a sanatorium, however well precautions are carried out for the disposal of infectious material. Certain exceptions to this rule will have to be made, but they should be very carefully considered in each case.

Leave

Provided the case has reached an advanced stage of treatment where no harm can be done by a trip to the patient's home—within reasonable limits of distance—it is certain that 48 hours away from the institution will benefit the patient and accelerate recovery. A typical example of leave which is of great value to the patient is that given before a major operation if the patient's condition allows it. A good working rule in most cases under treatment would be: no leave for at least four months after admission; leave within a limited distance during the next two months; and leave in all selected good cases after six months (the duration to be 48 hours as a maximum).

Operations

Asked what treatment they receive patients often say, "No treatment, just rest." Hence it is essential to bring home to patients the therapeutic value of rest and the fact that those on conservative treatment are not necessarily worse off than those who receive surgical treatment. Surgical operations act as a great fillip to the patients' morale; they feel very acutely that something is being done for them. Failure of an operation will hardly ever severely impair a patient's trust in his doctors if he has been forewarned, or if an explanation for the failure has been given to him afterwards.

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Similarly, ward morale will never be greatly upset by an expected death of a patient, but wards often react severely to the death of a patient after a minor operation. Feeling the icy atmosphere which he encountered on entering a ward, a medical officer had the pluck and the wisdom to explain to the patients how it happened and easily restored the balance.

Though no doctor, in compliance with the patient's wishes, will have an operation performed which is not absolutely indicated, it may be permissible to prolong A.P. treatment in the interest of the patient's sense of security.

Grousing

The customer is not always right; but the awkward customer is not always wrong. A fair hearing should be given to any grievances and grouses. In most cases a simple talk between the patient and the medical superintendent will settle all difficulties. To expel most patients of a rebellious ward does not necessarily deal effectively with the cause of their complaints.

Morale

Army experience has shown that morale is the essential basis of discipline. A unit of high morale needs very little discipline imposed from above. The same applies to sanatoria.

The usual entertainments, floor or ward duties, and the customary occupational therapy are of little avail against the demoralising and desocialising effect of a long stay in a sanatorium. The customary occupational therapy, it is true, is an effective means of killing time and, as such, has its definite value during the early stages of sanatorium treatment. It keeps the patients occupied and to some extent prevents them from brooding. But it may also foster childish regressive trends, and it fails to gratify the need of many tuberculous patients of doing something really useful. In most cases occupational therapy in its present form is remote from the patients' future occupation. For this reason alone, if for no other, it is felt that it should give way to graded work as soon as the time of their discharge is in view.

Walks are a welcome break in the sanatorium routine. To a certain extent their standardisation is unavoidable. But to walk along the same fixed route day in and day out, and several times during a day, is very boring. After the eighth round past "Hæmorrhage Hill" and "Sputum Pond" patients become tired—of going round in circles.

Graded work is an excellent means of testing a patient's ability to stand up to strain and of preparing him for his future tasks. However, to serve this function graded work must be constructive and interesting, and must vary according to the occupation of the patient. As it is, where graded work is available, resourcefulness and variety of jobs are often lacking, and the patient has no real incentive to do well.

Altogether very little, if any, organised mental stimulation is offered to patients in sanatoria. Adrian Hill's art therapy is a step in the right direction, but much more could be done, especially to meet the requirements of the working classes.

On Discharge

The return into the world after a prolonged stay in a sanatorium is an enormous step for many patients. To tide them over this difficult period perusal of a leaflet dealing with precautionary measures is hardly sufficient. A heart-to-heart talk between the superintendent or his delegate and the patient is essential; or, if this is impossible owing to lack of time, an aftercare talk to a group of patients proves of great value. In aftercare talks it is well to discuss the matter of childbearing. As a general rule a woman who has just completed a course of sanatorium treatment should not have a child for at least two years after the tuberculosis has become quiescent, and only then if the environment is satisfactory and the economic conditions are favourable. After the birth of the child the mother must remain in bed for at least a month instead of the usual fortnight. It is a sine qua non that, during and after labour, she should be carefully watched by the chest specialist as well as by the gynæcologist. It is necessary also to explain in detail contraceptive measures, which would go a long way towards preventing pregnancy during the unsafe period. It is as harmful to procure an abortion on a tuberculous patient as to allow her to proceed to term. If the superintendent is not qualified to discuss contraceptives in detail, the name of a competent birth-control clinic or gynæcologist should be given to the patient.

EXCISION OF THE ELBOW-JOINT

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With a foreword by

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Foreword (C. V. B.).—When Prof. H. J. Seddon visited the Orthopædic and Rehabilitation Centre in Nairobi in July, 1945, he was shown several Africans whose elbow-joints had been excised for various reasons and he was sufficiently impressed by the results to suggest that a series of cases should be published.

Having been dissatisfied with the results of arthroplasty, I have for nearly twenty years practised the method of straightforward excision of the elbow in the type of case described below, and, although it is only latterly with the opening of the centre that satisfactory after-treatment and "follow-up" have been practicable, in a reasonable proportion of cases useful joints have been produced.

A few years ago, before Mr. Kirkaldy-Willis was appointed surgeon in charge of the centre, he was present in my operating-theatre when I was dealing with one of these cases. He was too polite to express open derision but was completely sceptical of the prospects of a favourable result; he "stayed to praise" and his reward has been the series presented by him in this paper.

THE operation described here is a radical excision of the elbow-joint. The indications for this operation are: (1) tuberculosis, where excision of the joint removes the focus of disease and gives a full range of painless movement many months sooner than a sound ankylosis could be produced; (2) a recent comminuted fracture; (3) an old unreduced fracture dislocation; and (4) an osteo-arthritis following injury to the joint. In all these cases after operation there should be no more than 10° of limitation of flexion and extension, and in most of them there should be a full range of movement. The cases described below have all been operated on within the last fourteen months.

These cases may be divided into three groups on the basis of prognosis. In recent comminuted fractures, old unreduced fractures involving the joint, fracture dislocations, and early cases of tuberculosis recovery should be rapid and uneventful, and full movement with good lateral stability and good power of the triceps and biceps should be obtained within 3–6 months from the date of operation. In most cases of tuberculosis recovery is slower owing to the wasting of triceps and biceps, and therefore a further one or two months elapse before the power in these muscles and the lateral stability of the joint are adequate. In this second

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group a full range of movement is more easily and rapidly obtained than in the first. The third group includes comminuted fractures round the elbow accompanied by gross injury to another part of the body; ankylosis with wasting of the biceps and triceps; and tuberculosis with secondarily infected sinuses.

PREOPERATIVE TREATMENT

With fractures no special preoperative treatment is given beyond thorough preparation of the skin. In Africans at least three days' preparation of hand, forearm, and arm is advisable. With tuberculosis, where the general condition of the patient is poor, general treatment is given until the patient is fit to stand the operation. A prolonged period of rest is not given before operation, because the patient's condition will probably improve more rapidly once the focus of infection has been removed. In only one case was there evidence of pulmonary tuberculosis, and that was apparently quiescent.

OPERATION

General anæsthesia has been the rule, but a brachial-plexus block was used in one case. An inflatable cuff tourniquet is applied round the upper arm. The arm is held by an assistant across the patient's chest, the posterior aspect thus being uppermost. The surgeon stands on the side of the patient opposite the affected elbow.

Operative Technique.—A 5 in. midline posterior incision is made, centred over the tip of the olecranon, and carried down to the deep fascia. Skin towels are then applied. A non-touch technique is used throughout. With fresh scalpel and forceps the triceps and the aponeurosis covering the ulna are incised down to the bone. Starting over the tip of the olecranon on the medial side, the surgeon carefully lifts the triceps tendon and dorsal aponeurosis from the olecranon, keeping close to the bone, and taking great care not to weaken tendon or aponeurosis. The dissection proceeds medially, the triceps being separated from the lower end of the humerus with a scalpel until the medial epicondylar ridge is reached. The muscles arising from the postero-medial aspect of the upper ulna are dealt with in a similar manner close to the bone. Particular care is taken as the medial epicondyle is approached, the periosteum here being raised with a small chisel to free the ulnar nerve.

Aponeurosis, muscles, and nerve are then retracted medially with tissue forceps which grip the cut edge of the aponeurosis and a small portion of the underlying muscle. Passing anteriorly to the epicondyle, the surgeon next divides the common flexor tendon. The aponeurosis of triceps, brachioradialis, and the common extensor group of muscles are then separated laterally in a similar manner, close to the bone. There is no danger to the radial nerve, because the section is carried distally only as far as the neck of the radius. In cases of tuberculosis, particular care is taken not to open the elbow-joint, the plane of dissection being between muscle, tendon, or ligament and the pale œdematous synovial membrane of the joint.

The triceps is now retracted medially and laterally; the biceps is then separated from the lower end of the humerus by carefully passing a large periosteal elevator anteriorly to the bone, but in contact with it, from one side to the other. By moving the elevator up and down, the brachialis muscle can be separated throughout the required length. The elevator is held retracting the triceps and brachialis on one side; on the other side the muscles can be retracted with a bone lever or a small copper retractor. The humerus is then divided transversely with an ordinary bone-saw at least 1 in. and not more than $1^1/_2$ in. above the articular surface.

After section of the bone the lower fragment of the humerus is grasped with lion forceps and pulled backwards, facilitating the separation of biceps and brachialis from the anterior surface of the joint. The attachment of biceps to the tubercle on the radius is carefully preserved. The coronoid origins of flexor digitorum sublimis and pronator teres, two-thirds of the insertion of brachialis, and a portion of the coronoid head of flexor pollicis longus and flexor digitorum profundus are raised from the coronoid process. Adequate attachment for the brachialis remains if this manœuvre is carried out carefully.

The lower end of the humerus is further raised by pulling on the lion forceps and a copper spatula passed anteriorly to the joint and to the coronoid process and head of the radius. In fracture cases the line of section is just distal to the coronoid process and at the junction of the head and the neck of the radius, the orbicular ligament being preserved. In a few cases of tuberculosis it may be necessary to make the line of section $^1/_4$–$^1/_2$ in. farther distally, sacrificing the orbicular ligament. In such cases the insertion of the brachialis may be completely separated, but even so a good functional result should be obtained.

The separated portions of humerus, radius, and ulna are then removed together. The resulting cavity is washed out with flavine in water, and the bone ends are treated with Horsley's bone-wax. A small rubber drain is inserted into the cavity, and the triceps tendon and aponeurosis are sutured with no. 2 interrupted catgut, exact apposition being obtained. The skin towels are then removed, and the skin is sutured with interrupted silkworm gut or continuous silk.

Flavine dressings are applied and covered with a generous pad of wool. A fairly tight bandage covers this. The cuff tourniquet is removed, and the arm and forearm are placed at 90° to one another and bandaged to an adjustable splint. The operation takes 40–60 minutes.

POSTOPERATIVE TREATMENT

The drain is removed after two days, and the stitches after fourteen days. After four days the arm is flexed to 45° on the adjustable splint. After a further three or four days it is extended to 45° beyond the right angle, and then alternatively flexed and extended at similar intervals until three weeks have elapsed, when the splint is exchanged for an arm sling. The chief purpose of the splint during these three weeks is to control lateral movement of the elbow. In about 30% of these cases there was a weakness of the muscles of the forearm, especially of the extensors of wrist and fingers, which disappeared after 10–14 days; in such cases a plaster cock-up splint was applied for two weeks.

REHABILITATION

At the end of three weeks the patient is ready for rehabilitation. The arm sling is worn for two weeks to prevent lateral movement of the false joint. In fractures and early tuberculosis it is discarded at the end of this time; in advanced tuberculosis and where there is gross wasting of biceps and triceps it may be required for several weeks or even from two to three months.

The routine treatment consists of faradism to biceps and triceps, combined with active exercises for these muscles, with assisted movements to put the joint through its full range from complete flexion to complete extension. In fractures with relatively little wasting of the muscles the ability to flex and extend the elbow is quickly regained, but unless the joint is put through its full range of movement it tends to become stiff; if this happens, active exercises are carried out in an arm bath of warm olive oil. In tuberculosis with much wasting of the muscles their power is regained much more slowly;

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there is no difficulty in putting the joint through its full range, but a period of about three months longer is required before a useful limb results.

After the first month of physiotherapy those patients who had fractures are put on to sawing wood each day. The tuberculous patients are given this exercise after two or three months. In the fracture cases the patient can flex and extend the elbow against resistance and control lateral movement of the joint after three or four months; they are then discharged. In tuberculosis, from six to eight months elapse before this state is reached. At this stage treatment is discontinued and the patient is sent home.

Fig. 1—Tuberculous elbow-joint of case 1 in December, 1944.

RESULTS

Even in the most satisfactory cases the false joint is not so strong as the normal true joint, but in all the cases reported below the false joint has given the patient a limb that is very much more useful to him than it was before operation; it is painless, he has considerable control over lateral movement, and can raise the arm above the head and control it in that position, and flex and extend it against gravity. The fact that the patients can use the affected limb for sawing logs gives a fair estimate of its usefulness.

CASE-RECORDS

Case 1.—A male Kikuyu, aged 40, was admitted in December, 1944, with five years' history of gradually increasing painful swelling of the right elbow, preventing him from working in the last two years.

On examination, movement at the elbow was limited to 5°, between 45° and 50° short of full extension. Radiography showed much erosion of the articular surfaces, with decalcification (fig. 1). Tuberculosis was diagnosed.

On Dec. 19 the elbow was excised, without the joint being opened. The diagnosis was confirmed histologically. The wound healed well, except for a pin-point sinus in the middle. Physiotherapy was started after three weeks; in three months a useful arm resulted, with very fair power and full movement and lateral stability well controlled.

In June, 1945, the sinus was still discharging slightly; it was curetted. In September the sinus was curetted again, but no dead bone was discovered, and radiography showed no abnormality (fig. 2). In November his general condition was excellent, and radiography showed no signs of pulmonary tuberculosis, the sinus was healed, and there were full movement and increased power of biceps and triceps. Patient was sent home.

In January, 1946, his general condition and that of the elbow were as on discharge. The sinus remained healed.

Case 2.—A male Kikuyu, aged 20, with a month's history of a fall and injury to an elbow, which had not been treated.

On examination the elbow was fixed in the position of 150° of extension. Radiography showed a fracture dislocation of the elbow, with comminution of the head of radius and a fracture of the coronoid process (fig. 3).

On Jan. 16, 1945, a modified excision of the elbow was done, the olecranon process being left (fig. 4). On Feb. 5 patient was transferred to the rehabilitation centre for physiotherapy. At first movement was possible only between 50° and 135° of extension. The usual physiotherapy was supplemented by active exercises in the warm oil bath daily. After three weeks movement of the elbow-joint was painful and the range of movement decreasing.

On Feb. 27 $1\frac{1}{4}$ in. of the upper end of the ulna, including the olecranon and the coronoid processes, was removed (fig. 5). On March 24 physiotherapy was resumed. This led to a range of painless movement between 50° and 160° of extension, and excellent power of triceps and biceps, with very good lateral stability. Patient was discharged on June 26.

On Sept. 17 he came back for a further course of physiotherapy for three weeks, which led to full flexion and full extension of the arm at the elbow.

The attempt to obtain greater stability by doing a partial excision was not successful. The final result in this case was the best obtained in the whole series, the injured limb approximating very nearly in power and usefulness to the uninjured limb.

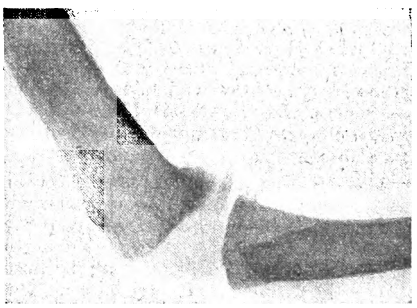

Fig. 2—Elbow of case 1 in September, 1945, after excision of joint.

Case 3.—A male Kikuyu, aged 45, was admitted on Jan. 12, 1945, with three years' history of gradually increasing pain and swelling of the right elbow-joint.

On examination there were much swelling and œdema of the elbow, with movement limited to a range between 60° and 110° of extension. Radiography showed advanced tuberculosis of the joint, with extreme erosion of the olecranon.

On Jan. 23 the elbow was excised, leaving a gap of 2 in. between the bones. On Feb. 12 there was a slight serous discharge from an ulcer measuring $\frac{1}{2} \times \frac{1}{8}$ in. in the middle of the wound. There was a full range of movement, and physiotherapy was started.

Recovery of active movement was much slower than in case 1. In April patient began to saw wood. In June the sinus was healed, and he had a full range of active extension and flexion, the power being fair only. This was a satisfactory result in view of the advanced tuberculosis. Radiography

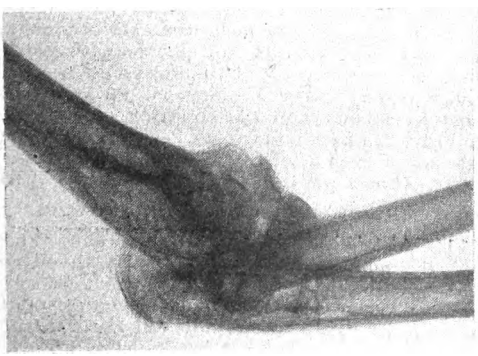

Fig. 3—Fracture dislocation of elbow (case 2).

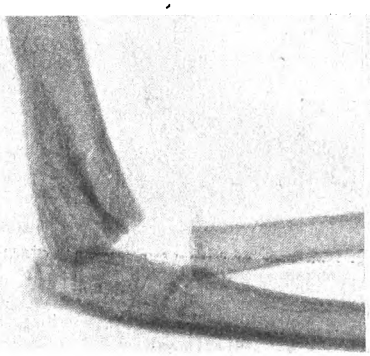

Fig. 4—Elbow of case 2 after modified excision of joint.

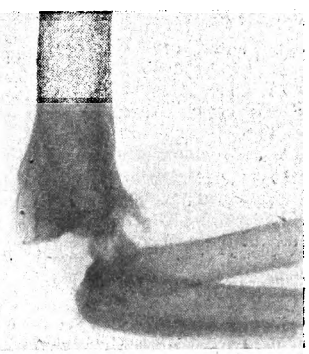

Fig. 5—Elbow of case 2 after removal of upper end of ulna.

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showed no sign of pulmonary tuberculosis and he was sent home at his own request.

Case 4.—A male Kikuyu, aged 30, was admitted on Feb. 6, 1945, with a fracture of the neck of the right humerus with 120° of rotation of the head on the shaft, and a comminuted fracture of the head of the right radius, olecranon, and coronoid process as the result of a motor accident.

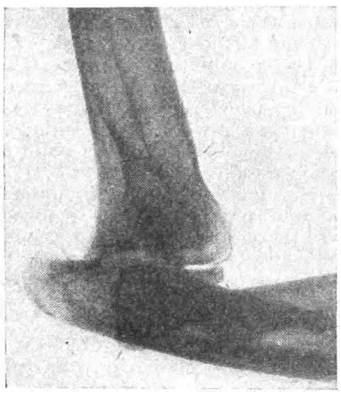

Fig. 6—Fracture dislocation of elbow (case 5).

The shoulder was manipulated and treated by extension on a Thomas's splint. After two further manipulations and increasing the extension, perfect reduction was obtained by the 15th. After four weeks the extension was removed and the arm placed in a sling.

On March 30 the elbow was excised. Physiotherapy was started four weeks later. There was much limitation of movement of the shoulder, wrist, and fingers, and well-marked weakness of biceps, triceps, and all the forearm muscles. At first there was only 90° of movement at the elbow, but he improved slowly and regained the movements of fingers, wrist, and shoulder, and 45° of active movement at the elbow. The improvement continued until his discharge to a military hospital in July.

Case 5.—A male Jaluo, aged 25, was admitted on May 16, 1945, with two years' history of injury to the right elbow.

On examination he had only 10° of movement at the elbow. Radiography showed a fracture dislocation of the elbow, with much deformity of the humeral condyles (fig. 6).

On May 22 the elbow was excised. On June 5 physiotherapy was begun. Patient progressed rapidly, till on July 19 the range of movement was from 40° to 180° of extension, with very good power of the biceps and triceps and good lateral stability. He was sent home on Aug. 7.

Case 6.—A male Kikuyu, aged 20, was admitted on May 19, 1945, with two years' history of pain and swelling of the left elbow and limitation of movement.

On examination the elbow was slightly swollen and tender, and there was only a few degrees' limitation of flexion and extension. Radiography showed decalcification, with early erosion of the joint surfaces.

On May 22 the elbow was excised, leaving a 2-in. gap. On June 5 physiotherapy was begun. The pathological report confirmed the diagnosis of tuberculosis. On July 19 patient could saw wood. On Sept. 4 he was discharged with full range of movement, good power of the muscles, and good lateral stability. He made a rapid recovery for a case of tuberculosis of the elbow. His general condition was excellent.

Case 7.—A male Kikuyu, aged 20, was admitted on May 22, 1945, with three years' history of injury to an elbow.

On examination the joint was painful and swollen, with much limitation of flexion and less of extension. Radiography showed an unreduced dislocation of the elbow, with new bone formation round the lower end of the humerus.

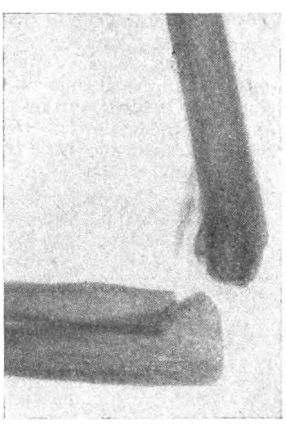

Fig. 7—Elbow of case 13, after operation on Nov. 7, 1945.

On June 1 the elbow was excised, leaving a 2-in. gap. On June 25 physiotherapy was started. On July 12 patient began to saw wood. On July 19 he had a full range of movement, the power of triceps and biceps being regained rapidly. On July 30 he was discharged to attend as an outpatient. The final result was very satisfactory, with full movement and very good power of the biceps and triceps.

Case 8.—A male Kikuyu, aged 25, was admitted on June 30, 1945, with nine months' history of pain and swelling of the right elbow.

On examination he had a tender swollen joint with a discharging sinus in front just below the joint. Radiography suggested tuberculosis with a secondary infection.

On July 16 the elbow was excised, leaving a 2-in. gap, in the hope of avoiding the necessity for amputation. On July 31 the wound was healing well. There was a small sinus anteriorly and another posteriorly. Patient was admitted to the rehabilitation centre. The laboratory report showed tuberculosis but no evidence of secondary infection.

As expected in so severe a case, the recovery was slow. In January, 1946, he had a full range of passive movements and active movements from 90° to 180° of extension. All the sinuses were healed, except a very slight discharge posteriorly. Patient was developing fair power of the biceps and triceps, his general health was much improved, and his progress promised a good result.

Case 9.—A male Jaluo, aged 30, was admitted on July 20, 1945, with six months' history of pain and swelling of the right elbow, with much limitation of movement.

Fig. 8—Case 13 sawing wood in January, 1946.

On examination radiography showed tuberculosis with much erosion of the lower end of the humerus. On the 24th the elbow was excised in the usual way. On Aug. 2 physiotherapy was begun.

On Sept. 17, in spite of physiotherapy, movement was limited to a range from 90° to 180° of extension. Radiography showed considerable new bone formation from the cut surfaces of the radius and humerus. The elbow was immobilised in plaster at a right angle for six weeks. On Nov. 5 physiotherapy was begun again, and patient attended daily as an outpatient. There was rapid recovery of the power of triceps and biceps and gradual recovery of movement.

On Jan. 24, 1946, movement ranged between 20° and 180° of extension. Lateral stability was good, with very good power of the muscles. This was a good result. Patient was finally discharged on the 24th.

Case 10.—A male Jaluo, aged 45, was admitted on July 11, 1945, with three years' history of severe injury to the right elbow and knee.

On examination there were fibrous ankylosis of the elbow in a position of 170° of extension, and fibrous ankylosis of the knee in a position of genu recurvatum and valgum.

On the 20th arthrodesis of the knee in the optimal position was performed. On Aug. 14 the elbow was excised in the usual way. The arthrodesis of the knee gave a satisfactory result. The excision of the elbow led to a full range of passive movement but cannot be considered successful, owing to gross fibrosis of biceps and triceps. These muscles regained very little power even after five months. Arthrodesis of the elbow in the optimal position was performed on Feb. 5, 1946.

This was the least successful case of the series.

Case 11.—A male Mnyole, aged 25, was admitted on Oct. 5, 1945, with five months' history of injury to an elbow. The history suggested that the dislocation was reduced in Kisumu Hospital but recurred shortly after his leaving hospital.

On examination there was fibrous ankylosis in a position of 160° of extension. Radiography showed an unreduced dislocation with much capsular new bone formation.

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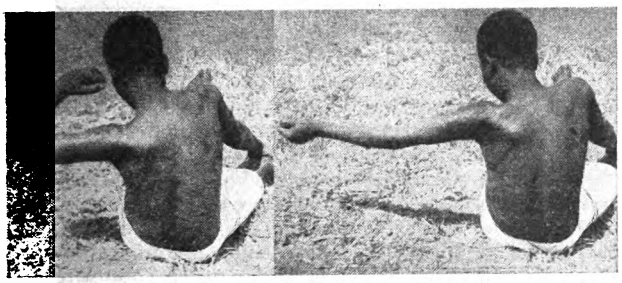

Fig. 9—Case 13 showing flexion. Fig. 10—Case 13 showing extension. January, 1946.

On Oct. 12 the elbow was excised leaving a 2-in. gap. Convalescence was complicated by measles. On the 27th physiotherapy was begun. The power of biceps and triceps was rapidly regained.

On Nov. 20 the range of movement was from 30° to 160° of extension. Radiography showed some formation of new bone in the false joint. Patient was discharged on Jan. 10, 1946. There was no increase in the range of movement, but he had a useful limb with very good muscular power.

In both this case and case 9 there was new bone formation. Horsley's wax was not smeared on the sectioned bone ends at operation.

Case 12.—A male Kikuyu, aged 40, was admitted with three years' history of pain and swelling of the right elbow.

On examination there was a fluctuant swelling at the back of the elbow-joint 7 in. long, 6 in. wide, and 4 in. deep, the skin not being ulcerated. He had a well-marked gibbus over the lower thoracic spine. Radiography showed much erosion of the joint surfaces of the elbow and extensive disease of the lower thoracic spine, both due to tuberculosis.

Patient refused treatment for the spine, but it was felt that, unless the elbow was operated on, the skin would ulcerate and a secondary infection would supervene. So, on Nov. 2, the cyst was carefully dissected out and removed. It communicated with the joint by a 1/2-inch opening above the radial head and contained thick yellow pus. The elbow-joint was then excised in the usual way. The wound healed well except for a small area in the middle of the wound with a slight discharge of thin fluid. Tuberculosis was proved histologically. Physiotherapy was begun on Dec. 6.

On Jan. 25, 1946, there was a full range of passive movement and he could flex the elbow to a right angle. The power of biceps and triceps was still poor, and patient had a slight watery discharge from the middle of the operation wound. His general condition was slightly improved, but he still refused treatment for the spinal disease.

Case 13.—A male Kikuyu, aged 19, was admitted on Nov. 5, 1945, with a recent T-shaped intercondylar fracture of the left humerus. One of the lower humeral fragments was rotated 90°, and the other 60°.

In view of a recent poor result from an open reduction and wiring of a similar fracture, the joint was excised on the 7th (fig. 7). Patient's convalescence was uneventful, and physiotherapy was begun on the 26th.

Progress was rapid in every way. From the start there was a full range of painless movement. On Jan. 24, 1946, patient could saw wood (fig. 8), already had good power of biceps and triceps (figs. 9 and 10) and fair lateral stability, and could raise his arm above his head. Two months' further treatment was expected to give an excellent result.

Case 14.—A male Indian, aged 40, was admitted on Jan. 8, 1946, with six weeks' history of severe injury to an elbow.

On examination the joint was held at 90° with only 15° of movement. Radiography showed an old supracondylar fracture of the humerus with gross posterior displacement and rotation of the lower fragment. The joint was excised on the 14th, leaving a 1 1/2-in. gap.

Patient had an uninterrupted convalescence. On the 26th there was a full and painless range of passive movement.

This case was expected to give, in three or four months, a result as satisfactory as any in this series.

COMMENTS

Fractures.—In 3 of the 8 fractures in which the elbow was excised the results have been excellent, with very good power and full movement. In 2 cases the results were very fair, with good power and 90° and 120° of movement. In 1 case the result was poor, owing to extreme wasting and fibrosis of biceps and triceps. In 1 case, with an associated fracture of the neck of the humerus, the record is incomplete, but progress was satisfactory until the patient left this centre. The most recent case promised an excellent result.

With the experience thus gained, in the fracture cases full movement and good power and stability should in future be obtained in every case of excision of the elbow performed for injury to the elbow, if there is no other associated injury.*

Tuberculosis.—Of the 6 cases described, 3 early cases have given highly satisfactory results. In 1 advanced case without a sinus the result was fair. In 1 advanced case with discharging sinuses the local condition and general health were much improved. In 1 advanced case with a tuberculous bursa and concomitant spinal disease the supervention of secondary infection has been avoided, though the patient refuses treatment for the spine.

In Kenya patients with bone and joint tuberculosis usually delay many months before coming to hospital. Those who come before the elbow-joint disease has become advanced, and before active disease develops in the lungs or other joints, should obtain a satisfactory result from excision.

SUMMARY

The rationale for excision of the elbow-joint in cases of severe injury and tuberculosis has been stated, followed by a description of the operative technique and postoperative treatment.

Brief case-records are given of 14 such cases.

SIGNIFICANCE OF PALATAL MOVEMENTS IN DIPHTHERIA

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PALATAL paralysis has been known as a clinical manifestation of diphtheria for many years and was described in the 2nd century. The study of the palatal mechanism, which presents unique opportunities for the visual observation of the influence of diphtheria on muscular contraction, merits more attention than it has hitherto received. The present article gives a brief account of palatal paresis and its significance in relation to nasal regurgitation and polyneuritis.

Day-to-day observations were made on palatal movements in 147 cases of diphtheria and in 150 normal throats. Records were made in successive cases, and the average time for onset of palatal weakness was summarised under the following headings:

(1) Shape of palate.
(2) Elevation of palate.
(3) Uvula: presence or absence of deflection from the midline; movements.
(4) Shape and movements of posterior pillars.
(5) Pharynx.

Of the 147 cases of diphtheria (107 bacteriologically positive) 80 showed no signs of palatal paresis, and 67 developed palatal weakness at about the sixteenth day.

* *Compound Fractures.*—Since writing this article I have seen 3 cases of compound comminuted fracture of the elbow-joint. These were treated by what was in effect excision of the elbow. One patient, in whom at first amputation through the upper arm was contemplated, had a final result as satisfactory as any in the series described. Another patient had also fractures of mid-humerus and mid-radius and ulna; the final result was very satisfactory. A third case in which the lower 2 inches of the humerus and upper 2 inches of the ulna were removed, leaving the radial head, promises to give a good final result.

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Two chief types of palatal weakness were observed: (1) defective or absent elevation of the soft palate; and (2) deflection of the uvula to right or left—hereafter termed deviation. The numbers of both types and the later complications associated with them are shown in the accompanying table.

TYPES OF PALATAL WEAKNESS AND LATER COMPLICATIONS

Palatal weakness	Nasal voice	Nasal regurgitation	Pharyngeal	Polyneuritis
Defective elevation.. 45	14	8	4	15
Deviation 22	11	7	4	10
Totals .. 67	25	15	8	25
Average day of onset				
16th	36th	38th	..	45th

The numbers of both types of palatal defect which subsequently remained free from paralytic complications were: defective elevation 30; deviation 12; total 42.

Of 80 cases without palatal paralysis, 2 developed polyneuritis in the fourth and sixth week.

The table shows that changes in palatal movements from diphtheria occurred in the second week, nasal regurgitation in the fifth week, and polyneuritis in the sixth week. In 42 of the total of 67 cases, palatal defects were the only manifestation of nervous involvement throughout the course of the diphtheria. In the remaining 25 cases (more than a third of the total), palatal changes were followed by polyneuritis later, which supervened about thirty days after the palatal weakness. Of these 25 cases, 15 developed nasal regurgitation also; nasal regurgitation was earlier and more frequent in cases where the uvula was deflected.

APPLIED ANATOMY*

The palatal muscles can be considered as forming three main loops (fig. 2):

(1) The upper or levator loop, composed of the two levator palati muscles, elevates the soft palate, thus closing the nasopharyngeal isthmus. The latter action is completed by the forward movement of the pharyngeal wall (Passevant's ridge).

(2) The middle or tensor loop is formed by the two tensor palati muscles, which act in a horizontal direction from the pulley of the hamula.

(3) The lower loop is made up by the palatoglossus and palatopharyngeus muscles.

Nerve-supply.—The levators are supplied through the pharyngeal plexus from the spinal accessory nerve. The tensor palati and the azygos uvulæ muscles are supplied by the fifth nerve through the otic ganglion.

Palatal Paresis in Relation to Anatomy.—Equal paralysis of both levators leads to defective elevation of the palate. In some instances I have noted absence of elevation accompanied by forward movement of the uvula (azygos uvulæ, fifth nerve). In 3 cases with lack of elevation the action of the tensor palati could be observed as a stiffening of the palate with slight downward movement.

Changes in the shape of the palate were common and are shown in fig. 1 C and D. Sloping and pleating appear to be due to tensor weakness on one side allowing distortion of the palate towards the sound tensor. Dimpling is probably the result of one weak tensor allowing slackness in the palatal sheet, which is readily pulled into a dimple at the insertion of the sound levator palati. These conditions are only associated with deviation (fig. 1 B). A further change was often noted in all types of palatal paresis—namely, curtain effect (fig. 1 C), where the posterior pillar on the membrane side formed a prominent fold.

In deviation accompanied by nasal regurgitation, two interesting features may be mentioned: (1) in all instances regurgitation of fluid was chiefly down the nostril on the paralysed or dragged side of the palate (fig. 1 B), which, being incapable of elevation, allowed leakage from below; (2) nasal regurgitation could be prevented in uvular deflection by merely making the patient fill his mouth with fluid, and, before swallowing, turn his head towards the shoulder on the opposite side to the deviation. Clinical use can be made of this manœuvre when regurgitation and dysphagia are causing distress and there is a danger that fluid will be aspirated into the trachea. The explanation is simple. The pharynx on the paralysed side is probably narrowed by pressures from structures in the neck when the head is well turned towards that side.

In 5 cases with deviation a curious condition was observed: the deflection was first towards one side and later towards the other. In all 5 cases the original deviation finally returned. I have termed this "crossing over."

Case 1, with bilateral membrane, originally showed an initial deviation to the left on the 9th day, which continued until the 13th day, when it began to be instable. The palate was still deflected to the left, but after repeated phonation it changed over to the right during the actual period of observation. On the 15th day the initial deviation was to the right, but it changed over to the left after repetition. On the 40th day it attained some stability and deviated only to the left.

Case 2, with bilateral membrane at the onset, the deviation was to the left on the 35th day, but on the 36th day it changed over to the right. This continued until the 40th day, when it reverted to the left again for a few days.

The remaining cases, with originally unilateral membrane, can be summarised thus:

Case 3.—From 19th to 32nd day left; from 32nd to 44th day right; and from 44th to 60th day left.

Case 4.—From 22nd to 56th day right, and from 56th to 69th day left.

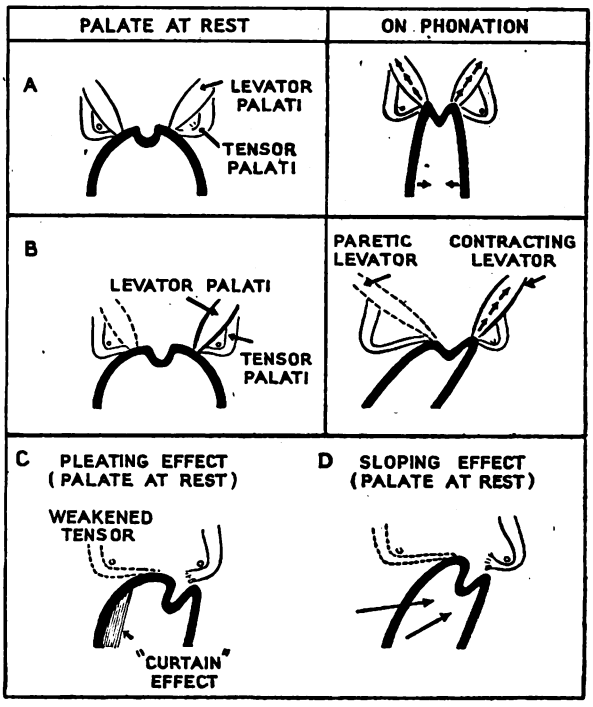

Fig. 1—Scheme of palatal muscular changes.

* An excellent account of the anatomy of the palate has been given by Oldfield (1941).

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Case 5.—From 27th to 30th day left; from 30th to 32nd day right; from 32nd day left, followed by no deviation until 35th day; from 35th to 36th day right; and from 36th day left.

"Crossing over" implies partial paresis of both sides of the palate. Though the levator of one side acts in unison with that of the other, for the purpose of considering deflection of the uvula the two levators can be looked on as being in opposition. The same applies to the components of the tensor loop. It is of interest that bilateral levator and tensor paresis happened when deposit of membrane was originally unilateral. This suggests that palatal involvement here was part of a general paralytic change rather than a local toxic effect. "Crossing over" can be explained by fatigue, the contracting levator weakening from usage and allowing the muscle of the opposite side to pull the uvula in the other direction.

In severe diphtheritic paralysis the pharynx can be observed to contract irregularly beyond the palate, and often, at a later date, the thyroid cartilage and trachea will be found displaced to one side. This was observed

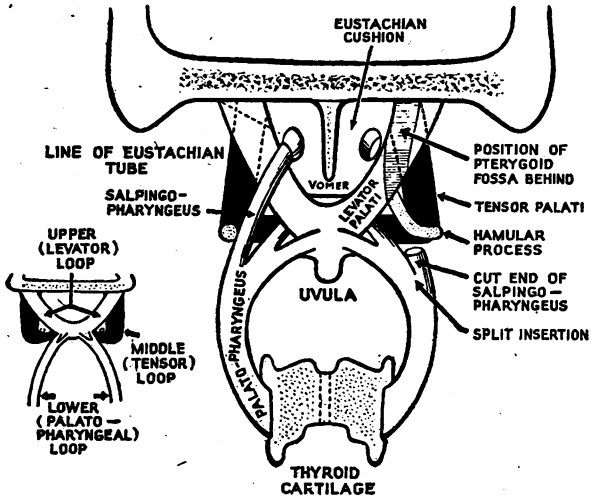

Fig. 2—Scheme of extrinsic muscles of soft palate.

in 4 cases. On deglutition it became pronounced. To this condition I have applied the term "deviation of the thyroid cartilage." It is due to weakness of the suprahyoid and suprathyroid muscles on one side, and corresponds to paresis of one levator in the palate causing deviation of the uvula.

CLASSIFICATION OF PARETIC APPEARANCES

PALATE

Abnormalities of Shape:
From unilateral levator and tensor paresis:
(*a*) Sloping of palate towards sound side (fig. 1 D).
(*b*) Pleating on sound side (fig. 1 C).

Abnormalities of Movement:
(1) Defective or absent elevation from bilateral levator paralysis:
(*a*) Unassociated with nasal regurgitation.
(*b*) Associated with nasal regurgitation, usually after an interval.

(2) Downward movement (uncommon). ? Levator paresis with tensors and lower loop unaffected.

(3) Deviation of uvula from unilateral levator and tensor paresis, usually associated with dimpling.
(*a*) Unassociated with nasal regurgitation.
(*b*) Associated with nasal regurgitation, usually after an interval.
Unidirectional deviation is common, while variable deviation ("crossing over") is rarer.

PHARYNX

(4) Anomalies of pharyngeal contraction, usually with (1) and (3), with or without nasal regurgitation.

SUPRAHYOID

(5) Defective elevation of thyroid cartilage due to paresis of suprahyoid muscles, associated with (3) and (4) and causes deviation of trachea. Commonly associated with severe nasal regurgitation.

CLASSIFICATION OF MUSCLES OF DEGLUTITION IN RELATION TO PARESIS

Muscle	*Clinical manifestations of paresis*
Levator palati	(1) Bilateral: falling of arch; defective or absent elevation; nasal voice and regurgitation (common). If tensor palati is not affected, palate can be seen to move slightly down. (2) Unilateral: falling of arch on affected side; deviation (fig. 1 B); nasal voice and regurgitation through nostril of paralysed side (common).
Tensor palati	(1) Bilateral: absence of palatal tightening; dysphagia. (2) Unilateral: dimpling; sloping and pleating; curtain effect on posterior pillar (fig. 1C and D).
Azygos uvulæ	(1) Bilateral: lack of movement. (2) Unilateral: irregular protrusion of uvula.
Palatoglossus and palatopharyngeus	Defective or absent inward movement of the pillars of the fauces; no clinical effects.
Salpingopharyngeus, tensor tympani, &c.	Intermittent deafness associated with palatal weakness.
Constrictors	Irregular movement of posterior pharyngeal wall; nasal regurgitation often.
Suprahyoid muscles	(1) Bilateral: defective elevation of thyroid cartilage on deglutition; severe dysphagia (common); nasal regurgitation often associated. (2) Unilateral: deviation of thyroid cartilage on deglutition; severe dysphagia (common); often associated with nasal regurgitation.

NATURE OF DIPHTHERITIC PARALYSIS

The spread of diphtheria toxin has been the subject of some controversy in the past few years. All appear to agree that the later and widespread effects seen on the musculature arise from the toxins distributed by the general circulation. It is in regard to earlier nerve involvement that differences arise. Walshe (1918) considers that a local spread occurs along the nerves from the inoculation site (fauces) to the medulla by spreading along the perineural lymphatics. On the other hand, Ronaldson and Kelleher (1935) argue that the palate is affected in extrafaucial diphtheria. Earlier Ronaldson (1925) considered local spread as occurring only in severe diphtheria where palatal muscles in proximity to toxins were affected—"precocious paralysis." Later cranial effects he ascribed to tissue dissemination (regional spread).

Some significant indications can be observed in palatal paresis and in the musculature from the effects of toxin. In palatal paresis, where part of the palate is affected, we have two different nerve-supplies to the same anatomical structure—namely, fifth for the tensors and eleventh for the levators. In paresis generally, the pattern of accommodation, palate, pharynx, and predominance in legs, all point to usage as the probable factor. The limbs also tend to show pattern involvement. In a series of cases I observed, all except 3 had weakness of the legs. In 22 the arms were affected. In 11 one arm was mainly weakened, and in 9 of these it was the right. In Cameron's series the right arm was predominantly paretic, with the grasping muscles chiefly involved (Cameron and Muir 1942).

Whatever view is adopted about the earlier stages, it is put forward here that diphtheria toxin enters the circulation shortly after membrane formation, giving rise to the generally toxic condition commonly seen together with the cardiac manifestation of the early stages.

It is suggested that diphtheria toxæmia affects the length of the peripheral nerve as far as and including the end-plates, setting the muscles "at the ready" for usage to determine the paralysis. End-plate involvement renders musculature liable to paresis when fatigued; paralysis develops a considerable time after the application of the toxin. My observations give me the impression that this well-recognised interval ("temps perdu" of Lavergne) may not be due to the late effect of the

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toxins per se. Some other factor appears to precipitate the paralysis. That this factor may be fatigue is suggested by the transfer of paresis seen in crossing over. Also, in considering the anatomical elements involved in deglutitional complications, the groups affected suggest a continuity of weakness along one physiological system independently of the nerve-supply to its various components—e.g., palate to pharynx, pharynx to elevators of the hyoid. The view that fatigue is a prominent factor in promoting paralysis is also supported by the common observation that allowing patients to read too early promotes paralysis of accommodation.

Since my return to England my attention has been directed to an observation by Scholes (1927), whose series of diphtheria cases number 33,477. He was also impressed with the importance of usage as an ætiological factor—" continued functioning of the muscles after the damage has been done."

SUMMARY

Palatal paresis in diphtheria mainly consists of two types: defective elevation of the palate and deviation of the uvula.

Reversal of uvular deflection has been noted in 5 cases during the course of palatal paresis. It is suggested that its ætiology lies in fatigue.

Nasal regurgitation in deviation cases can be prevented by simple postural treatment.

Movements of the thyroid cartilage have been observed in diphtheria, and deflection of the cartilage is sometimes observed in severe paralysis.

The effects of diphtheria toxin generally on the musculature are discussed, and it is suggested that the effect of fatigue on affected end-plates is a prominent factor in paralysis.

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CLINICAL EXTRACORPOREAL DIALYSIS OF BLOOD WITH ARTIFICIAL KIDNEY

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SEVERAL workers have tried to construct an efficient apparatus for the dialysis of a patient's blood outside the body. Abel (1913) seems to have been the first to call such a device an artificial kidney; and Kolff invented one capable of being used clinically (Kolff and Berk 1944, Kolff 1946).

Various ill effects, such as hæmolysis, lowered blood-pressure, shock, and pulmonary œdema, were reported by Kolff to follow dialysis with his apparatus. These drawbacks are minimised by the method of construction of Alwall's dialyser, which we have used, with modifications, since 1945 (Alwall 1947, Alwall and Norviit 1947).

The first apparatus was built as follows:

The 'Cellophane' tube through which the blood flowed was wound round a cylinder of wire netting immersed in a glass container filled with saline solution kept constantly moving by a motor-driven propeller. A mantle of wire netting held the cellophane tube compressed so that the layer of blood was very thin, independently of the pressure in the tube. In this way the conditions for a quick dialysis were very good. The cylinder was fixed in a box with a close-fitting lid which prevented evaporation and allowed saturation of the saline solution with oxygen and carbon dioxide.

The necessary fluid balance between the blood in the cellophane tube and the saline solution could be obtained by adjusting the dialyser at the required level below that of the patient.

For use with human patients the apparatus measured 42 cm. (about $16^1/_2$ in.) high and 20 cm. (about 8 in.) in diameter. The container held about 600 ml. of blood, and about 25 litres of salt solution. Dialysis area about 6500 sq. cm.

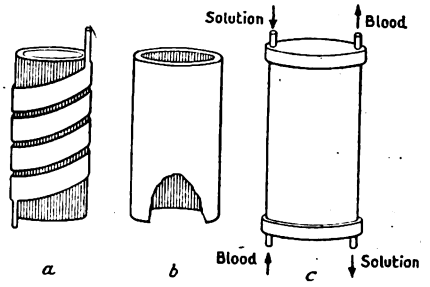

Fig. 1—Diagrams showing construction and assembly of Alwall's dialyser: (a) inner cylinder with cellophane tube wrapped round it; (b) outer cylinder, grooved on inner aspect; (c) cylinders assembled with top and bottom.

All the results reported here refer to the apparatus described above. The apparatus was later simplified and improved as follows:

The cellophane tube, through which the blood is to flow, is wound round a vulcanite or metal cylinder bearing on its outer surface longitudinal grooves, and is placed inside a second cylinder similarly grooved on its inner surface. The two cylinders are held firmly in position by tightly fitting top and bottom (fig. 1).

The space between the two rigid cylinders is so calculated that the cellophane tube can contain only a thin layer of blood of predetermined thickness which cannot be altered.

During dialysis, while the blood flows through the cellophane tube, a thin stream of saline solution flows in the opposite direction along the grooves on the cylinders.

With this construction fluid balance between the blood in the cellophane tube and the saline solution in the grooves on the cylinders is obtained in the manner described above; the osmotic water attraction of the blood is compensated by a corresponding hydrostatic pressure.

In the latter construction it is possible to combine the positive pressure of the blood in the cellophane tube with the negative pressure of the saline solution outside the cellophane tube. A screw clip on the rubber supply tube controls the speed with which the saline solution flows to the apparatus. The saline solution flows off through a long rubber tube which discharges at a lower level than that of the apparatus (the tube, for instance, is lowered into a discharge-pipe). The length of this rubber tube thus determines the negative pressure of the saline solution on the cellophane tube.

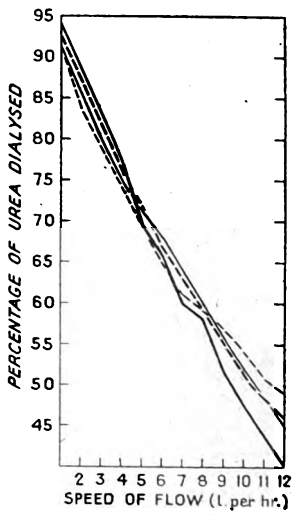

Fig. 2—Dialysis of urea solutions of 125, 250, 500, and 750 mg. per 100 ml. at different speeds of flow.

Before dialysis is started the patient is heparinised to prevent coagulation of the blood in the dialyser.

Before the apparatus is connected with the patient or the animal the cellophane tube as a rule is filled with blood. The arterial pressure drives the blood from the radial artery through the apparatus back to the median cubital vein. When dialysis is interrupted a short-circuit is opened between the glass cannulæ in the blood-vessels.

The operation for exposing the blood-vessels is done the day before dialysis if possible, to prevent excessive bleeding after the heparinisation.

By adding citrate to the saline solution it may be possible to reduce the risk of coagulation in the apparatus and do

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away with the need of heparin and, consequently, the danger of bleeding in uræmic colitis and so on.

ADVANTAGES

This apparatus is relatively small and easy to handle and has a great dialytic capacity. The blood is continuously distributed throughout the whole cellophane tube in an unvarying thin layer. The whole of the cellophane tube is in continuous contact with the salt solution. Since the saline solution is in uninterrupted motion and is changed at suitable intervals, it should be possible to make use of the maximal capacity of the cellophane tube.

The blood does not have to pass any rotating cylinder, rotating couplings, or rotating Beck-pump as it has to in Kolff's apparatus. The arterial pressure drives the blood through the apparatus back to the vein; thus there is no hæmolysis. There is less risk of coagulation. The heparin dosage can be considerably reduced in comparison with that used by Kolff; thus there is less risk of bleeding.

The cellophane tube can be exposed to arterial pressure direct without any increase in its content, which is controlled and constant. Thus the blood-pressure does not fall during the treatment, there are no such dangerous shock complications as Kolff reports "when too much blood is allowed to run from the patient into the kidney."

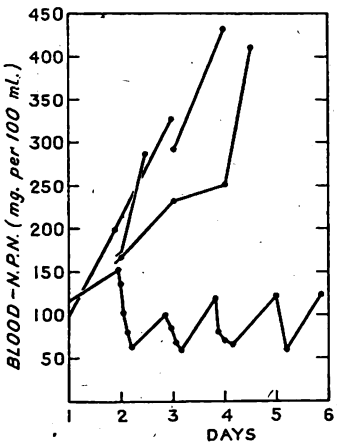

Fig. 3—Dialysis of blood of a rabbit with both ureters ligated (lowest curve), compared with four controls in which dialysis was not used.

The apparatus offers the essentially new and practically important possibility of maintaining, by means of adjusted hydrostatic pressure, a fluid balance between the blood in the cellophane tube and the surrounding saline solution.

The apparatus is furnished with a tightly fitting lid which prevents evaporation and allows saturation of the saline solution with a suitable mixture of oxygen and carbon dioxide for regulation of the pH through CO_2—bicarbonate. Kolff's cylinder rotates in an open tank.

TESTS WITH UREA SOLUTION

Fig. 2 gives the results of the tests with solutions of urea in water in concentrations of 125, 250, 500, and 750 mg. per 100 ml., and at speeds of flow from 1 to 13 litres an hour. The urea solution was dialysed against water at 40°C. At low speeds of flow 90% or perhaps somewhat more of the urea was removed by dialysis; at a speed of flow of 5 litres an hour about 70%; at 10 litres an hour about 50%; and so on.

The speed of flow from the radial artery through the apparatus in clinical dialysis is about 8–10 litres.

The percentages of urea eliminated decreased with increasing speed of flow, but the dialytic action, expressed as the absolute quantity of eliminated urea, increased with the speed of flow within the limits investigated.

TESTS ON ANIMALS

Ligation of Ureters.—One rabbit was treated with dialysis of the blood for 4–6 hours daily for 4 successive days. There were four untreated controls. The treated rabbit died after 138 hours from hæmorrhage in the abdominal cavity; the heparinisation contributed towards the bleeding. The results are shown in fig. 3.

Acute Mercurial Poisoning.—One rabbit was treated with dialysis of the blood for 6 successive days. There were seven untreated controls. The results are shown in fig. 4.

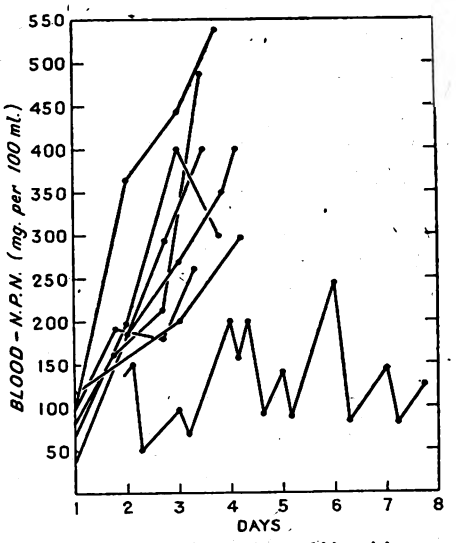

Fig. 4—Dialysis of blood of a rabbit with acute mercurial poisoning (lowest curve), compared with seven controls in which dialysis was not used.

CLINICAL USE OF DIALYSIS IN URÆMIA

Case 1.—A man, aged 49, moribund with chronic nephritis and uræmia, diffuse silicosis of the lungs, chronic bronchitis, and bronchopneumonia.

During 6 hours' dialysis about 45 g. of non-protein nitrogen (N.P.N.) was eliminated, and the content in the blood decreased by 98 mg. per 100 ml. to 320 mg. per 100 ml. The œdema round the eyelids practically disappeared during the treatment. The general condition obviously improved. Patient died next day of uræmia and bronchopneumonia.

Case 2.—A woman, aged 54, with hypertonia and probably chronic nephritis and acute nephritis, with pneumonia, who was passing only small amounts of urine and had a rising blood-N.P.N. level, increasing œdema of her face, and her general condition deteriorating, was comatose when dialysis was applied. Owing to a technical mishap only about 60% of the cellophane tubing in the dialyser could be used.

During 8 hours of dialysis 18 g. of N.P.N. was eliminated, and the blood-N.P.N. level sank from 235 to 182 mg. per 100 ml. The daily output of N.P.N. in the urine before treatment was only 2–3 g.

Her general condition improved considerably, and the œdema decreased. After a later temporary deterioration patient regained her health, with a normal blood-N.P.N. level but reduced renal function, as shown by tests.

In cases 1 and 2 the speed of flow of the blood through the dialyser was low.

Case 3.—A woman, aged 44, with two years' history of symptoms of cancer uteri, a history of nephrectomy, and a month's history of decreasing amounts of urine owing to compression of the remaining ureter.

Her blood-N.P.N. level was gradually increasing. Progressive deterioration of general condition during the last few weeks with constant nausea and vomiting.

On examination patient was comatose. Blood-N.P.N. levels: 131 mg. per 100 ml. on Jan. 14; 240 mg. per 100 ml.

TABLE I—DETAILS OF CASE 3

Blood levels	First dialysis treatment (5 hours on Feb. 8)		Second dialysis treatment (8 hours on Feb. 9)	
	Before	After	Before	After
Non-protein nitrogen (mg. per 100 ml.)	346	182	200	77
Xanthoprotein (units)	140	80	120	70
Indican	++	+	++	+
Uric acid (mg. per 100 ml.)	13·3	7·3	9·3	4·6
Bicarbonate (m. mol.)	12·1	19·1	15·7	20·3
Total base (m. mol.)	157	157	161	158
Chloride (mg. per 100 ml.)	369	369	387	404
Sugar (mg. per 100 ml.)	240	300	290	290

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on Jan. 22; 225 mg. per 100 ml. on Jan. 31; 346 mg. per 100 ml. on Feb. 5 and Feb. 7.

Treatment.—Dialysis (flow speed about 6 litres of blood an hour) for 5 hours on Feb. 8 eliminated 34 g. of N.P.N., and for 8 hours on Feb. 9 eliminated 28 g. of N.P.N. During treatment the general condition improved in a striking manner, the patient becoming bright and lively. For details see table I.

During the week which followed the dialysis the patient said she had "not felt so well for a long time" and could eat "better than she had done for the last month." Improvement in general condition continued, and patient was satisfied with the result. During the last two days of her life she had a change for the worse, and she died suddenly on Feb. 18.

Case 4.—A woman, aged 57, with congenital polycystic disease of the kidneys which had progressed to the stage of advanced renal insufficiency, had had severe progressive symptoms of uræmia for at least two weeks. She was comatose when dialysis was applied.

During 20 hours' continuous dialysis, with a speed of flow of the blood about 8–10 litres an hour, about 70 g. of N.P.N. was eliminated, and the blood-N.P.N. level decreased from 222 to 57 mg. per 100 ml. Her general condition improved considerably, and after some days patient could leave her bed for several hours every day.

The improvement in her general condition continued, and she felt quite well during the following month in spite of a blood-N.P.N. level of about 100–125 mg. per 100 ml. During the last two weeks of her life her condition gradually deteriorated and her blood-N.P.N. level rose. She died of uræmia and bronchopneumonia.

TABLE II—RESULTS OF DIALYSIS

Case no.	Diagnosis	Blood-N.P.N. level (mg. per 100 ml.)		Dialysis	
		Before treatment	After treatment	N.P.N. eliminated (g.)	Length of treatment (hours)
1	Chronic nephritis	418	320	45	6
2	Chronic and acute nephritis ..	235	182	18	8
3	Cancer uteri and anuria—				
	Feb. 8 ..	346	180	34	5
	Feb. 9 ..	200	70	28	8
4	Polycystic disease of kidneys	222	57	70	20
5	Chronic nephritis	234	71	80	20
6	Acute and subacute nephritis	364	100	70	17
		292	118	64	10
7	Nephrosclerosis	125	83	13	4
8	Renal hypoplasia and chronic nephritis	230	133	55	18*

* For 14 hours only 60% of the cellophane tubing could be used.

Case 5.—A man, aged 59, with a long history of chronic nephritis and uræmia. During 20 hours' dialysis about 80 g. of N.P.N. was eliminated and the blood-N.P.N. level fell from 234 to 71 mg. per 100 ml. His general condition improved considerably.

The results obtained in these and three further cases are shown in table II.

SUMMARY

Alwall's dialyser or artificial kidney is described.

After successful preliminary tests with a solution of urea, followed by dialysis of blood in tests on animals, the dialyser was used to treat eight patients with uræmia.

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SENSITISATION OF PENICILLIN-RESISTANT BACTERIA

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MANY observers have made organisms insensitive to penicillin in vitro, but no methods have yet been published of rendering penicillin-insensitive bacteria sensitive, except by repeated culture. I report here experiments showing that penicillin-sensitivity can be restored to some insensitive bacteria by association with other bacteria or their products.

The original idea was that penicillin-sensitivity might depend on the presence of a chemical or physical factor. If this were correct, it might be possible, in certain circumstances, for bacteria short of or devoid of this chemical factor to borrow it from other bacteria possessing it, or it might be that growth in association with a sensitive microbe would alter, in some way, the physical structure.

In choosing the bacteria it seemed wise to start with resistant strains of an organism of which most strains are known to be penicillin-sensitive.

On the assumption that during growth of a penicillin-sensitive organism a chemical substance is produced which might be transferred to, or act on, the resistant strain, the general procedure adopted was to grow the resistant and the sensitive organisms together in mixed culture and then isolate the resistant one and test its sensitivity. The control was provided by subculturing the resistant bacterium in a similar manner and growing it on the same medium but without the sensitive strain.

FINDINGS

1. *Change in a Resistant Streptococcus Grown with a Staphylococcus.*—In the first experiment a resistant strain of hæmolytic streptococcus was used. This was grown for 24 hours with a sensitive staphylococcus (standard Oxford strain) in broth and then subcultured on half a blood-agar plate, while on the other half the resistant streptococcus was grown alone. Single streptococcus colonies were then selected from each side, planted one on each half of another blood-agar plate, and a penicillin solution containing 10 units per ml. was poured on half the plate (so as to cover half of either section) to test the sensitivity of the bacteria.

After 24 hours' incubation there was growth throughout the whole length of the control culture, while the strepto-

INCREASE IN SENSITIVITY OF FOUR PENICILLIN-RESISTANT STRAINS OF STAPHYLOCOCCI GROWN WITH A HÆMOLYTIC STREPTOCOCCUS (MILNE)

Resistant strains of staphylococci	Growth in broth containing different concentrations of penicillin (units per ml.)							
	500	100	20	4	0·8	0·16	0·03	Control
6652 Control ..	−	++	++	++	++	++	++	++
Treated*	−	−	−	−	−	−	+	++
7007 Control ..	−	++	++	++	++	++	++	++
Treated*	−	−	−	−	−	−	+	++
6821 Control ..	−	−	++	++	++	++	++	++
Treated*	−	−	−	−	−	−	+	++
44 Control ..	−	++	++	++	++	++	++	++
Treated*	−	−	−	−	−	−	+	++
Standard Oxford strain	−	−	−	−	−	−	+	++

* Grown in mixed cultures with hæmolytic streptococcus.

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coccus which had grown in the previous culture with the staphylococcus showed complete inhibition of growth on the penicillin-covered part (fig. 1). The experiment was repeated with the same results. No further investigation has been possible with this particular streptococcus, however, because the culture died out.

2. *Change in a Resistant Staphylococcus Grown with a Hæmolytic Streptococcus.*—A resistant staphylococcus (6652) was next used with a sensitive streptococcus (Milne) as the "sensitising" organism. The organisms were grown together in broth, and then the staphylococcus was isolated and its sensitivity to penicillin tested, by both the agar-cup and the serial-dilution methods. The staphylococcus, which would originally grow in broth containing 500 units of penicillin per ml., was, after growing for 24 hours with a hæmolytic streptococcus, inhibited by a concentration less than 0·1 unit per ml. Ten resistant strains of staphylococcus, including 6652, were then treated in the same way, and four showed a great increase in sensitivity while no change was obtained in the other six. The results are shown in the accompanying table, from which it is clear that some strains of staphylococci rapidly recover their sensitivity to penicillin if grown in mixed culture with a hæmolytic streptococcus. These experiments were repeated several times and gave almost constant results when the same bacteria were used.

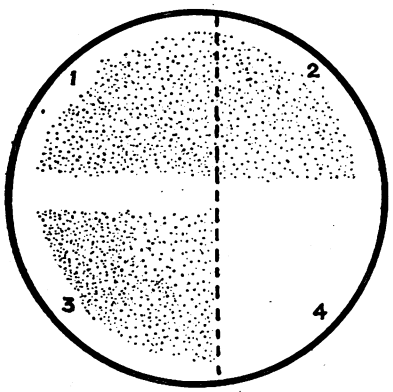

Fig. 1—"Sensitising" effect of staphylococcus on a penicillin-resistant streptococcus: sectors 1 and 2 planted with untreated streptococcus; sectors 3 and 4 planted with treated streptococcus; penicillin 10 units per ml. on sectors 2 and 4.

To exclude the possibility that the staphylococci rendered penicillin-sensitive might be of a different strain from those in the control, further experiments were carried out in which cocci from the controls were treated in the same way with streptococci and rendered sensitive as before. A series of the controls of the previous experiments treated in that way repeatedly gave the same good results.

As a further precaution, cocci from the same colony were used for the control and for growing with the hæmolytic streptococcus. The results were the same. The control remained resistant, while the bacteria which had been grown with the hæmolytic streptococci showed a great increase in penicillin-sensitivity. All these staphylococci were coagulase-positive.

The four strains which showed increase of sensitivity varied somewhat in the degree of their original resistance, and two—6652 and 7007—were penicillinase-producers. The six strains which did not respond were of various degrees of resistance, and some produced penicillinase while others did not. The increase in sensitivity seems, therefore, not to depend either on the original degree of resistance or on the production of penicillinase.

At one stage in the experiments it appeared that the streptococcus had no action on the resistant staphylococcus. At this time the streptococcus had been freshly subcultured from the stock meat culture, but when it had been subcultured many times it was found to have recovered its sensitising action on the staphylococcus.

3. *Sensitising with Other Bacteria.*—Sensitive bacteria other than streptococci were tried. The resistant staphylococcus 7007 was grown with streptococcus, pneumococcus, *C. diphtheriæ*, and with a mixture of all three. In all cases some increase in penicillin-sensitivity was obtained, while the controls remained resistant, as shown by titration on an agar plate by penicillin in a gutter (fig. 2B, 1, 2, 3, and 5).

Ten new resistant strains of staphylococci were grown with streptococcus, *C. diphtheriæ*, and pneumococcus. Two of the ten showed an equal increase in penicillin-sensitivity with all three bacteria.

4. *Sensitising with Bacterial Autolysates.*—The ten resistant staphylococci referred to in the previous paragraph were grown in a pneumococcus autolysate. This was even more effective in sensitising the two strains of staphylococci than were the living bacteria (fig. 2B, 4). It had previously been found also that old cultures of streptococci grown at room temperature were very effective. Experiments were therefore made using as the sensitising agent bacteria lysed by bacteriophage, autolysis, and chemicals.

Bacteriophage: a staphylococcus phage was used to which the standard Oxford strain of staphylococcus was susceptible. The penicillin-resistant strains chosen this time were 7007 and "Bill," which were both unaffected by this bacteriophage. These strains were grown in broth with the Oxford strain

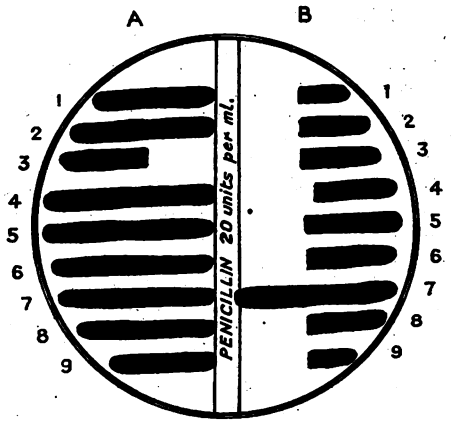

Fig. 2—Sensitivity of strains of resistant staphylococci treated with "sensitising" agents on an agar plate with penicillin in a gutter.

A		B	
Sensitising agent	Results	Sensitising agent	Results
1. Bacteriophage	Not sensitised	1. Streptococcus	Sensitised
2. Standard Oxford staphylococcus	Not sensitised	2. Pneumococcus	Sensitised
3. Standard Oxford staphylococcus + bacteriophage	Sensitised	3. *C. diphtheriæ*	Sensitised
4. Filtrates of broth cultures of streptococcus	Not sensitised	4. Autolysed pneumococcus	Sensitised
5. Filtrates of broth cultures of pneumococcus	Not sensitised	5. Mixtures of streptococcus, pneumococcus, and *C. diphtheriæ*	Sensitised
6. Filtrates of *C. diphtheriæ*	Not sensitised	6. None (Standard Oxford strain of staphylococcus)	Naturally sensitive control
7. Heat-killed cultures of streptococcus	Not sensitised	7. None	Naturally resistant control
8. Heat-killed cultures of pneumococcus	Not sensitised	8. *Bact. coli*	Sensitised
9. Heat-killed cultures of *C. diphtheriæ*	Not sensitised	9. *Bact. typhosum*	Sensitised

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as a sensitising agent and a sufficient amount of bacteriophage to lyse the Oxford strain. Both 7007 and Bill acquired a great increase in penicillin-sensitivity (fig. 2A, 3), whereas in the controls, provided by growing the cocci in the same media, (*a*) alone, (*b*) with the bacteriophage, and (*c*) with the standard Oxford strain of staphylococcus, they retained their original resistance.

Autolysis of the Oxford strain of staphylococcus by anaerobic culture failed to give good results. (In general the Oxford staphylococcus proved a very poor sensitiser of resistant staphylococci, except when bacteriophage was used as well, though it was very effective when hæmolytic streptococci were the resistant bacteria.) Autolysed pneumococci, as mentioned before, yielded better results than did living organisms.

Chemicals: sodium oleate 0·05% was used to make the cell-membrane of both the sensitive and resistant bacteria more fragile. It was hoped that the assumed chemical compound would then be more easily transferred from sensitive to insensitive bacteria. Diphtheria bacilli were chosen as the "sensitising" bacteria.

The results were as follows: (*a*) the resistant bacteria grown alone, with or without sodium oleate, remained resistant; (*b*) when grown with diphtheria bacilli three out of fifteen—the same as previously—increased greatly in penicillin-sensitivity; and (*c*) when grown with diphtheria bacilli and sodium oleate five out of fifteen—three of them the same as previously—became penicillin-sensitive. This experiment has not been repeated.

5. *Sensitising Action of Penicillin-resistant Organisms.*—When these experiments were begun, it was assumed that only penicillin-sensitive bacteria had the power to increase the sensitivity of resistant bacteria. To check this assumption, *Bact. coli* was grown with fourteen resistant strains of staphylococci. Three resistant strains became sensitive, two being strains which became sensitive when grown with hæmolytic streptococcus, pneumococcus, or *C. diphtheriæ* (these having always been the same). When this experiment was repeated with another strain of *Bact. coli* there was an increase in the penicillin-sensitivity of the three strains which were always rendered sensitive by streptococcus, pneumococcus, or *C. diphtheriæ*. Growth with *Bact. typhosum* or with Friedlander's bacillus equally increased the penicillin-sensitivity of the same strains.

6. *Is it Essential for Sensitisation that the Bacteria should be Grown Together?*—It had been assumed in the earlier experiments that, for the sensitising action to take place, it was necessary for the two bacteria actually to grow together. This assumption was tested by mixing equal amounts of broth cultures of the resistant staphylococci and broth cultures of streptococci, pneumococci, diphtheria bacilli, and *Bact. coli*, and placing them in the refrigerator, where no growth would occur. At the same time similar mixtures were incubated at 37°C. After 24 hours the staphylococci were isolated by spreading a small inoculum on agar plates so that the colonies would be widely spaced to avoid close growth of penicillin-sensitive and resistant bacteria. Controls were provided by the same cultures of staphylococci, diluted by an equal amount of broth, being kept in the same conditions for the same time.

The controls remained unchanged, but of fourteen resistant staphylococci three (the same three which it had been found possible to sensitise in other experiments) became penicillin-sensitive whether growth in the mixture had taken place or not.

7. *Effect of Time.*—In all the experiments hitherto described the penicillin-sensitive and the resistant bacteria were kept together for at least 24 hours. Experiments were now made to find the shortest time in which the change from resistant to sensitive would take place. It was found sufficient to allow the organisms to remain together for 5 min., either in the incubator, at room temperature, or in the refrigerator.

8. *Effect of Bacterial Filtrates.*—Filtrates of broth cultures of streptococcus, pneumococcus, and diphtheria bacillus were made through seitz filters and gradocol membranes. These filtrates were used as sensitising agents for staphylococci in the same way as the whole cultures, but the staphylococci remained resistant.

In one experiment, in which resistant staphylococci were grown in broth on one side of a gradocol membrane and *C. diphtheriæ* on the other side, after 48 hours' growth there was a great increase in the sensitivity of the staphylococcus to penicillin. It therefore appears that in certain conditions the sensitising agent, whatever it is, can pass through a gradocol membrane.

9. *Sensitising Effect of Cultures Killed by Heat.*—Broth cultures of pneumococcus, streptococcus, staphylococcus, *C. diphtheriæ*, and *Bact. coli* grown for 24 and 48 hours were killed by heat (60°C for 2 hours). These were used whole as well as the supernatant fluid after centrifugation. No change in the penicillin-sensitivity of any of the fourteen resistant staphylococci was provoked in any case.

10. *Permanence of the Sensitivity Induced by Mixed Culture.*—Four strains of staphylococcus with sensitivity induced by mixed culture with *C. diphtheriæ* kept their newly induced sensitivity unaltered through 22 subcultures in broth.

DISCUSSION

We have heard a great deal about staphylococci acquiring resistance to penicillin; and the danger of underdosage in inducing such acquired resistance has often been pointed out. Todd et al.[1] showed that staphylococci which they had rendered resistant by long exposure to non-lethal doses of penicillin gradually lost their resistance on subculture; but many naturally occurring strains of staphylococci are abnormally resistant to penicillin and retain this property in pure culture for a long time. These naturally resistant strains for the most part produce penicillinase, whereas the strains artificially made resistant do not.

In these experiments twenty strains of resistant staphylococci were used—some penicillinase-producers and some not—and there were seven to which a considerable degree of sensitivity could be restored simply by growing them in association with, or exposing them to the influence of, another organism. Four of these seven strains produced penicillinase and so could be classed as naturally resistant.

It has rather been assumed that naturally resistant strains retain their resistance permanently in the body; but from the experiments cited above it seems clear that when some of such strains grow in association with other bacteria—a condition which often happens in the body—they may lose their resistance. This change has been shown to take place within a few minutes of the bacterial association, and it is reasonable to assume that such a change can happen in the body.

It is true that up to now only seven out of twenty strains tested have undergone this change, but what happens to one strain will probably happen to another if the right conditions can be found. The conditions of bacterial association in the body are many and varied; so it appears that nature has provided a method of maintaining the sensitivity of these organisms, or at least some of them, to penicillin.

Though every attempt should be made to use penicillin so as to avoid the formation of resistant strains, the experiments described here show that the process is reversible, and the contention that in the near future all strains of staphylococcus will be resistant to penicillin must be reconsidered.

1. Todd, E. W., Turner, G. S., Drew, L. G. W. *Brit. med. J.* 1945, ii, 603.

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The foregoing experiments are of a preliminary nature, and only the fringe of the subject has been touched; many possibilities have not yet been examined, and others only incompletely. This work is continuing.

SUMMARY

Some strains of penicillin-resistant staphylococci and streptococci can readily be made sensitive by growing in mixed culture with other organisms, either penicillin-sensitive or penicillin-insensitive.

The same change can be induced if the bacterial association occurs in the refrigerator, where growth does not take place.

Some bacterial autolysates can also affect this change.

The acquired sensitivity lasts a long time.

The importance of this in penicillin therapy is discussed.

I have to thank Dr. Mary Barber for kindly supplying cultures of some of her penicillin-resistant staphylococci; Sir Alexander Fleming for his advice, interest, and encouragement in the preparation of this paper; and my many colleagues and friends at St. Mary's Hospital for their help.

THROMBOCYTOPENIC PURPURA WITH THYROTOXICOSIS

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THE association of thrombocytopenic purpura with endocrine disorder has been noted by Bomford and Rhoads (1941), who, in a series illustrating refractory anæmia, described 4 cases of such a combination, in 2 of which the endocrine disturbance was thyrotoxicosis. Evans and Perry (1943), in a survey of thrombocytopenic purpura, noted 4 cases of thyrotoxicosis; associated endocrine disorder was confined to females past the age of puberty (3 of their cases occurred in a group of 17 women over forty years of age).

The influence of the endocrine system on the platelet level in health has been shown by Pohle (1939), who demonstrated the gradual lowering of the platelet level during the fortnight preceding menstruation in normal women, and its more rapid rise to the original level after menstruation has ceased. An exaggeration of this mechanism is shown by Minot's (1936) report of 3 cases of recurrent premenstrual thrombocytopenic purpura which resolved spontaneously after 3–7 attacks. Further evidence is provided by Watson et al. (1947), who noticed that thrombocytopenic purpura may occur as a complication of stilbœstrol therapy.

The case here reported is of thrombocytopenic purpura associated with thyrotoxicosis.

CASE-RECORD

A married woman, aged 34, was admitted to hospital on March 10, 1945, complaining of weakness and lassitude, dyspnœa, and general malaise, which had begun two and a half years previously. Six months later she had noted a swelling in her neck, pronounced sweating, nervousness, and a further gradual deterioration of her general health. She had then been told by her doctor that she had thyroid trouble. Another six months later she had begun to have epistaxis and menorrhagia. At this time, too, small red spots had appeared on the legs for a few days. The patient's health had continued poor, and a month before admission she had had some swelling of the ankles.

She had one brother and three sisters alive and well, and two healthy children. There was no relevant past history of disease.

On admission she was thin and pale, with a yellowish complexion and pale mucous membranes. There was slight prominence of the eyeballs, some ptosis of the left eyelid, and a left internal strabismus. There were no other eye signs of thyrotoxicosis, and the reactions and movements of the eyes were otherwise normal; the fundi were normal, and there were no hæmorrhages. The teeth were in good condition, but the gums bled spontaneously. No glands could be felt in neck, axillæ, or groins. There was a diffuse mild enlargement of the thyroid gland. Nothing abnormal was found in heart or lungs. The pulse was regular and of good volume; rate 128 per min. The sleeping pulse-rate varied between 94 and 112 per min. There was no fever. Blood-pressure 112/68 mm. Hg. The abdomen was soft, and no unusual feature was noted. The spleen was not felt. (At no time during the period in hospital was the spleen palpable.) There was no abnormal feature in the central nervous system. Some œdema was found round the ankles, but none was detected elsewhere. The urine was normal.

Three days after admission crops of purpuric spots were visible on the neck, chest, and arms. Hess's test was positive. Blood-count: red cells 2,700,000 per c.mm., Hb 48%, colour-index (C.I.) 0·9; white cells 4500 per c.mm. (polymorphs 54%, lymphocytes 41%, monocytes 5%). No platelets were found. Bleeding-time 30 min. (normal 2–5 min.); clotting-time 8 min. (normal 4–7 min.). Some poikilocytosis, well-marked anisocytosis. Basal metabolic rate +41·5; blood-cholesterol 90 mg. per 100 ml., Wassermann and Kahn reactions negative. Fractional test-meal showed no free acid, and the specimens were bloodstained.

A blood-transfusion of 3 pints of group-O blood was given. Two days later a blood-count gave red cells 4,200,000 per c.mm., Hb 54%, C.I. 0·64; white cells 6000 per c.mm. (polymorphs 35%, lymphocytes 60%, monocytes 2%). Fresh crops of purpuric spots appeared after the transfusion, and bleeding took place from the nose and gums. Treatment with ascorbic acid and vitamin P was then started in standard dosage. Full doses of iron were given throughout the illness.

The patient continued to bleed, and her condition deteriorated. Blood-count on April 9, 1945, seventeen days after the transfusion: red cells 2,060,000 per c.mm., Hb 34%, C.I. 0·85; white cells 3700 (polymorphs 79%, lymphocytes 21%); 2 nucleated red cells were seen in a count of 100 white cells; polychromasia was well marked.

A transfusion of 3 pints of fresh group-O blood was given. For twenty-four hours the patient felt and looked better, but thereafter relapsed. Blood-count two days after the transfusion: red cells 2,030,000 per c.mm., Hb 38%, C.I. 0·95; white cells 6000 per c.mm. (polymorphs 76%, lymphocytes 20%, monocytes 4%). Vitamin B and hydrochloric acid were then administered, and a sternal puncture was done on April 14. The marrow count gave:

	%		%
Polymorphs	26	Lymphocytes	7
Metamyelocytes	11·5	Monocytes	2
Myelocytes	10·5	Normoblasts	35
Myeloblasts	None	Erythroblasts late	5
		Erythroblasts early	2

Total nucleated cells 49,000 (normal 25,000–100,000).

Leuco-erythrogenetic ratio 1 : 1 (normal 8 : 1–2 : 1). No megakaryocytes seen.

Thiouracil was then started (April 15) in a dosage of 400 mg. daily, on the grounds that the association of the thyroid condition with the platelet aplasia might be more than fortuitous, and that control of the former might ameliorate the latter.

On the 21st the patient's condition was again poor, and 2 pints of group-O blood was transfused. The improvement was only temporary, and three days later she died. Six hours before death the Hb was 16% and the white-cell count 9000 per c.mm.; there was no neutropenia.

DISCUSSION

The association of purpura with endocrine disease, particularly with thyrotoxicosis, is noteworthy. The effect of the ductless glands on platelet levels may give a clue to the ætiology of purpura of this type. Sternal puncture revealed that this patient had a complete marrow aplasia of the platelet system. Sternal marrow counts have not been published in the previously reported cases, though Hertzog (1947) described a picture of an increase of normal and immature megakaryocytes in the marrow of cases called "primary thrombocytopenic purpura." This may indicate a maturation defect in some primary purpuras, to be distinguished from a

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suppression of the platelet system due to endocrine disorder as in this case.

No conclusions can be drawn as to the effect of thiouracil in such cases, since the patient did not live long enough to reap any benefit; a ten days' interval is usual before symptoms begin to subside with this therapy. There is no evidence that the drug exerted any depressant effect on the bone-marrow in this case, for the neutrophils at the time of the patient's death were as high as at any time since her admission.

Dr. F. E. Saxby Willis kindly gave permission for the publication of this case. Dr. Margaret Gillespie undertook the pathological work.

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RECURRENT BULLOUS ERUPTION OF FEET

REPORT OF A CASE

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EPIDERMOLYSIS bullosa is an uncommon condition characterised by vesicular or bullous lesions of the skin on sites exposed to trauma. In most cases it is congenital, and there is often evidence of hereditary transmission (Cane 1909).

Weber (1926) described a form of epidermolysis bullosa limited entirely to the feet except for one lesion on the perineum. The patient was a boy, aged 4 years, who had had recurrent bullous eruptions on the soles of his feet in warm weather since the age of 1 year. There was no family history of similar disturbance.

Cockayne (1938) described, under the name "recurrent bullous eruption of the feet," two similar cases and drew attention to the inheritance of the disease as a "conditional dominant."

The present case is a further example of this localised type of epidermolysis bullosa.

An English corporal in the R.A.F., aged 25, was admitted to a military hospital, M.E.F., with sore and blistering feet. He had had no other noteworthy illness.

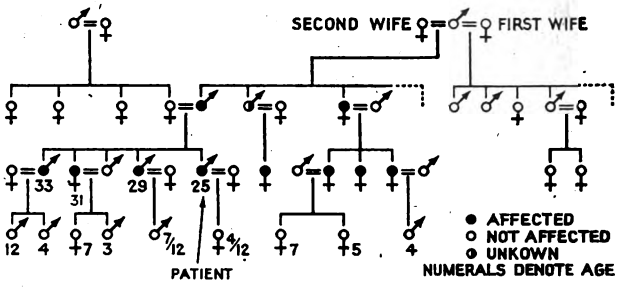
Since the age of 9 years he had had recurrent attacks of these symptoms on taking moderate exercise. The condition had been worse in summer, but even in winter the symptoms had been produced by walking some three or four miles. His feet had become sore, and areas of redness had developed, which had become blisters.

There had been no associated irritation. Usually he had opened the blisters; but, if left alone, they had been highly resistant to trauma and had burst only if considerable force had been used. Patient said that only once had a blister become septic.

In 1940–43 patient had served in Canada, where the frequency and severity of his attacks had increased, especially in hot weather. He had reported sick many times for this and finally had been admitted to a hospital in Toronto, where he had been treated by a dermatologist for two months.

In March, 1946, he had arrived in the Middle East, and after only two weeks, without any active duties, a severe recurrence had started; a week later he was admitted to hospital.

His family history showed that this disease had been transmitted as a dominant for at least two generations (see figure). In all the affected persons the lesions were limited



Family tree showing transmission of epidermolysis bullosa.

to the feet and recurred frequently in the summer months. There were no other hereditary diseases in the family, and no relationship between this condition and the colouring of either the hair or the eyes. Nor was there any history of mental disease in the family. His father became free of symptoms shortly before his death at the age of 46.

On examination there was no abnormality of the skin except on the feet, which were affected with a moderate hyperidrosis. On both feet there were vesicles and bullæ, the left foot being the more severely affected. The bullæ varied in size, the largest, on the lateral border of the left foot, being 3 cm. in diameter. Each lesion was surrounded by a well-marked erythematous halo. The unopened lesions were tense, painful, and superficial, and the only deep lesion was situated on the left heel. The lesions were found beneath all the toes, over the 1st and 5th metatarsophalangeal joints of both feet, along the lateral border of the left foot, and on the left heel. There was no scarring from previous lesions.

The skin was so vulnerable that bullæ could be produced readily by scratching or rubbing. On rubbing an unaffected area of skin on one foot for some 2 minutes a bulla 1 in. in diameter appeared within 5 minutes.

Patient was of asthenic build, normal nutrition, and average intelligence, with exaggerated tendon reflexes and pseudo-clonus at the ankles. Hair brown. Eyes blue. No abnormalities of hair, nails, or teeth. Mucosæ normal. No evidence of disease or dysfunction in any other system.

Investigations.—Blood-count: leucocytes 9200 per c.mm. (neutrophils 54%, lymphocytes 42%, monocytes 4%, no eosinophils or basophils). Blood Kahn flocculation test negative.

Blister fluid contained numerous erythrocytes, leucocytes (neutrophils 70%, mononuclears 30%, no eosinophils), and degenerate cells. Culture of fluid sterile.

Urine: no albumin or sugar; nothing abnormal detected in deposit.

Treatment.—In Canada patient had been treated with 3% salicylic acid in alcohol, X rays, and ultraviolet rays for three weeks. There had been no improvement after any of these treatments. In his units he had been given various foot-baths without benefit.

After admission to this hospital the bullæ were aspirated, and patient was kept in bed for a week. At the end of the week all the lesions had dried, and he was allowed to walk in the ward wearing sandals. No other treatment was given, and no further lesions developed except for two small bullæ, on the dorsal surface of his left big toe, which he thought had been produced by scratching.

DISCUSSION

In the cases described by Cockayne (1938) and Weber (1926) the lesions developed between the ages of 1 year and 2 years, were limited to the feet, and appeared only in warm weather. Weber suggested that hot weather was a more important exciting factor than was local trauma. Cockayne pointed out that the condition resembled epidermolysis bullosa simplex in that "no scarring results, the mucous membranes escape, there is no acrocyanosis, no hyperidrosis and neither epidermal cysts nor dystrophy of the nails has been noted."

The present case showed the same essential features except for the later age of onset and the appearance of the lesions in cool weather if the feet were subjected to greater provocation than in summer. In addition he had

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hyperidrosis of the feet, which developed as soon as he arrived in the Middle East and persisted throughout the period of observation.

War service, which exposes the feet to conditions far more vigorous than those of civilian life, would bring these cases to the notice of a medical officer before very long. In view of the very large numbers of feet which must have been examined throughout the war years, this disease must be very rare, though some cases may have passed unrecognised.

SUMMARY

A further case of recurrent bullous eruption of feet is described.

The limitation of the lesions to the feet and the familial inheritance of the disease are well illustrated in this case.

We wish to thank Major R. P. Warin for his helpful advice and criticism, and the Director of Medical Services, Middle East Forces, for permission to publish this case.

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Medical Societies

DEVON AND EXETER MEDICO-CHIRURGICAL SOCIETY

Acute Rheumatism

ADDRESSING this society on Dec. 18, Prof. C. BRUCE PERRY (Bristol) said that rheumatic heart disease accounts for 2% of all deaths and for 10% of all deaths under the age of 40. There are still about 200,000 fresh cases of acute rheumatism each year. How and why do people get the disease? Hæmolytic streptococci of no particular strain appear to be the exciting cause, but the predisposing causes are at least equally important. Scarlatinal rheumatism, so called, is identical with acute rheumatism. "Miniature relapses" are common; these are recognisable only when the patient is under close observation, and the only manifestation of them may be a rise in the sleeping pulse-rate. Epidemics of acute rheumatism follow epidemics of sore throat. The disease reaches its peak in this country in December and January, and it is most rare during August and September. In New York it reaches its peak in March. In Arctic and tropical regions it is rare but not unknown. Children between the ages of 5 and 15 are most prone to it, and females are more commonly attacked than males, though carditis—especially aortic endocarditis—is often worse in the male. There is a clear-cut social factor in the ætiology of acute rheumatism, which is commonest among the poor. The familial nature of the disease has often been noted, but it is difficult to balance the relative importance of heredity and environment. During the past thirty years there has been a decline in incidence.

Treatment must be directed primarily against the carditis. Rest in bed, not flat but propped up on pillows, for at least six weeks is necessary. With evidence, however slight, of continued infection, the rest period must be prolonged until at least a month after this has completely disappeared. General hygienic measures must be adopted and local measures taken for the relief of joint pain. Salicylate in full doses, not necessarily combined with sodium bicarbonate, remains the best drug treatment; penicillin and tonsillectomy are both valueless, and results from prophylactic sulphonamides have not been impressive.

Jornada Médica, which began monthly publication in Buenos Aires in June, 1947, is finely produced and clearly printed on good paper. The first issue contained a description of the construction of a new finger by a tube graft from the abdominal wall; but most of the articles are reviews of medical topics.

Reviews of Books

On the Problem of Poliomyelitis

An Epidemiological-Statistical Study. BERTEL S. BERTENIUS. *Acta path. microbiol. scand.* 1947. Suppl. LXVIII.

Dr. Bertenius has carefully reviewed the data on poliomyelitis provided by the morbidity and mortality statistics of civilised countries, in the hope—fulfilled—of eliciting some fresh facts. He convincingly refutes some of the more plausible and widely held theories about poliomyelitis, and shows that from the beginning of the present century, when "infantile paralysis" ceased to be a justifiable synonym for it, there has been a steady increase in the number and extent of epidemics. These culminated in some European countries between 1911 and 1913, and in the United States in 1916. But the variety of poliomyelitis experience in different countries is striking: for example, Iceland, where the disease was first reported in 1918, had the heaviest attack-rate in the world between 1924 and 1938. Statistical analysis of the incidence of the disease in Sweden and the U.S.A. is used to test suggested explanations of the seasonal rise in incidence during the late summer and autumn. The factors responsible, he notes, differ from those operating in gastro-intestinal disorders, such as enteric fever or dysentery; and this suggests that poliomyelitis is not essentially a food- or water-borne disease. Nor does he find support for Aycock's theory that the seasonal trend of poliomyelitis can be correlated with winter-summer temperature differences; or for Petersen's suggestion of a connexion between poliomyelitis prevalence and sunlight. Studying Swedish data on age-incidence, he finds that of 17 contagious diseases none showed a displacement of mortality towards the older age-groups, as happened with poliomyelitis between 1911 and 1920 and again between 1931 and 1938. Poliomyelitis in fact appears to be exceptional among infectious diseases in not following the law of age-precession based on naturally acquired immunity. The studies of incidence in Swedish town and country districts and its relation to population density provide no evidence that immunity is produced by subclinical attacks.

He concludes that overt clinical poliomyelitis is an expression of a special predisposition in the individual attacked, as well as of the activity of a specific virus. This predisposition appears in different age-groups and in different countries at different times; moreover, it is not necessarily present in the same age-groups in both town and country districts at the same time. Individual predisposition, he thinks, is much influenced by seasonal factors which may well be dietary. Experimental work showing that a diet effectively promoting the growth of an animal also renders it susceptible to the virus of poliomyelitis is quoted in support of this hypothesis. Thus human food of summer and autumn, although not directly a vehicle of virus transfer, may contain agents which increase susceptibility. He is pessimistic about the prospects of controlling poliomyelitis by means of immunological methods as understood at present. Some simple procedure, possibly using a chemical, should be sought, he thinks, which will render the host-cells insusceptible to invasion by the virus.

Modern Dermatology and Syphilology

(2nd ed.) S. WILLIAM BECKER, M.D., clinical professor of dermatology, University of Chicago; MAXIMILIAN E. OBERMAYER, M.D., clinical professor and chairman of the department of dermatology, University of Southern California. Philadelphia and London: J. B. Lippincott. 1947. Pp. 983. £5 10*s*.

THE second edition of this important textbook has been brought up to date, and readers will again be struck by the hard core of common sense which runs through it. There is no mad rush to recommend fashionable new remedies before their worth has been proved. Professor Becker rightly warns readers several times against the use of sulphonamides for local therapy: dermatologists are all too familiar with the sensitising properties of these drugs when so employed, knowing from bitter experience that an impetigo, for example, treated with

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sulphonamide ointment is often converted to a sulphonamide dermatitis which may take many months to clear up. The original sulphanilamide is recommended as the best general remedy for erysipelas. Unfortunately the edition went to press too early for an account of the treatment of lupus vulgaris with high-potency vitamin D to be included. The volume is now a little larger than it was, but there is very little redundant matter, and the excellent photographs and sound advice on therapy make it easy to commend it.

The Appendix

R. J. McNEILL LOVE, M.S., F.R.C.S., F.A.C.S., surgeon, Royal Northern Hospital, London. London: H. K. Lewis. 1947. Pp. 186. 12s. 6d.

THIS is the kind of book which, appearing at intervals, serves to keep the practitioner up to date in his knowledge of a very common disease. The basic facts are stated succinctly, important points being driven home by examples from the author's large experience. He considers every aspect of the disease, but most surgeons will feel that he over-emphasises the advantages of delayed operation, which, though often advisable, can be dangerous, especially (as he admits) in the case of children. On this and on some debatable points of technique he has clearly made up his mind, and commendably says so. He presents his subject in a very interesting way.

Methods of Diagnosis

LOGAN CLENDENING, M.D., F.A.C.P., late professor of clinical medicine and history of medicine, University of Kansas; EDWARD H. HASHINGER, M.D., F.A.C.P., professor of clinical medicine in the university. London: H. Kimpton. 1947. Pp. 868. 63s.

CHARACTER in medical textbooks is not common, and not many spare space for quotations which may be more entertaining than informative. Dr. Clendening and Dr. Hashinger have not hesitated to go to first principles and to point the way to clear thinking and logical reasoning in diagnosis. Indeed, the first 50 pages—Logic and Diagnosis—make not only profitable but unusual reading. The main purpose of the book, however, is to provide data for diagnosis—facts, methods, symptoms and signs, and normal standards for reference in ordinary practice. The real gold-mine it offers has a few veins of less valuable, if equally glittering, metal. The chapters on blood-chemistry, functional tests, electrocardiography, and X-ray diagnosis are first-class, and those on methods of physical examination and on history-taking are more readable than the subject might suggest.

Gynécologie médicale

J. E. MARCEL; MAURICE FABRE. Paris: Maloine. 1947. Pp. 733. Fr. 2540.

EXCEPT for its flimsy paper covers, this French textbook of gynæcology is handsomely produced, and it is generously illustrated with 563 diagrams and photographs, and several coloured drawings. The work covers almost every method of investigation, and mentions lesser known ones, not often employed in this country, like hysteroscopy. It also covers every kind of gynæcological manœuvre, including some forms of treatment which are a little heterodox, such as diathermy to the pituitary and the intravaginal ozone douche. It makes stimulating reading, and will appeal to specialists and general practitioners with gynæcological leanings; but it is too advanced for undergraduates and students, and the controversial nature of some of the subject matter will not recommend it to those taking higher examinations in this country.

Introduzione Alle Psicologia (Milan: Società Editrice Vita e Pensiero. 1947. Pp. 438. Lire 900).—The widespread belief that respect for Thomas Aquinas has necessarily a fatal influence on the development of psychology in Catholic universities is to some extent disproved by this book by Agostino Gemelli, O.F.M., and Georgio Zunini. The senior author is a neoscholastic whose contributions to the psychology of speech and of perception are well known; his psychological department in the Catholic University of the Sacred Heart at Milan has produced much interesting research. The book traverses the philosophical problems, the various experimental schools, the traditional themes of psychology (memory, perception, affect, will, and instinct), animal behaviour, personality, and character. It displays a wide but superficial acquaintance with American studies, except for the vast psychometric literature and indeed all the more precise statistical works, which are ignored. It is a reminder that, although remote from the main stream, Italian psychology has not been negligible, and that it has counted among its leaders such distinguished investigators as de Sanctis, Kiesow, Mosso, and Benussi.

The American Illustrated Medical Dictionary (21st ed. Philadelphia and London: W. B. Saunders. 1947. Pp. 1660. 42s.).—Dr. W. A. Newman Dorland's dictionary is an old friend, and the pleasure of meeting a new edition—reliable, comprehensive, and keen on the scent of a new term—is always great. This one, being as good as every forerunner, needs no fresh recommendation.

New Inventions

BLUNT BOOMERANG NEEDLE AND ACCESSORIES

THE sharp boomerang needle introduced by Young and modified by Harris and others has proved an essential instrument for many urological operations. The substitution of a blunt needle makes it possible to use the instrument for other purposes where transfixion of vessels is to be avoided. It was originally devised to underrun the veins lying in the fatty tissue in front of the prostatic capsule in the operation of retropubic prostatectomy. As Millin [1] has said, "these veins are very friable and are not easy to ligature." With the blunt boomerang needle it is easy to pass two ligatures round them and divide between. The needle is also useful for

Fig. 1—Blunt boomerang needle.

Fig. 2—Ligature carrier.

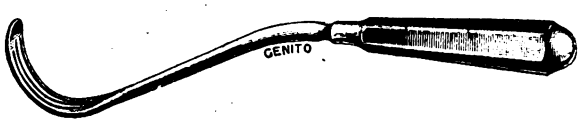

Fig. 3—Boomerang guide.

the kidney pedicle in nephrectomy, for the vesical pedicles in total cystectomy, for the cystic duct in cholecystectomy, and in many similar situations.

LIGATURE CARRIER

The usual pattern of ligature carrier with bow handles for use with the boomerang needle is inconvenient in that it cannot readily be opened with the left hand and must be wielded by the assistant. The sugar-tong type with a thumb catch illustrated has been found to possess many advantages; it can be used with either hand, and enables the surgeon himself to synchronise the retraction of the needle with the release of the ligature.

BOOMERANG GUIDE

For work deep in the pelvis a guide has been made which conforms to the curve of the boomerang needle. It has three grooves on the concave surface, the lateral ones to guide the boomerang needle, and the central one to allow for section of the pedicle. It is used mainly to pass beneath the inferior vesical vessels in total cystectomy, but it has other obvious uses.

These instruments have been made for me by the Genito-Urinary Mfg. Co., Ltd., and I am indebted to Mr. Schranz for his help with them.

London, W.1. E. W. RICHES, F.R.C.S.

1. Millin, T. Retropubic Urinary Surgery, Edinburgh, 1947, p. 85.

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THE LANCET

LONDON: SATURDAY, JAN. 10, 1948

What is Nursing?

IN their review of the Working Party's report on the recruitment and training of nurses, King Edward's Hospital Fund [1] start from the proposition that the primary task of a nurse is to care for the sick and helpless under medical direction, and the primary task of recruitment is to provide nurses for that purpose. They find in the report "little conception of nursing as the skilled care of the sick, but rather a strong bias towards public health work for nurses." Reforms in nursing, they hold, "should tend towards greater skill in bedside nursing"—a policy we have long advocated.

Bedside nursing, patients say, is best done at the bedside. Our present nursing training seems to be founded on the moving-belt principle, except that it is the nurse who keeps moving. Instead of dividing out the patients among them, nurses have divided out the work, undertaking a "round" of this or a "round" of that—two to make beds, two to give bedpans, two to serve the dinners—until every patient appears to the student nurse as an incident in a series of chores. This may be the quickest way of getting the work done, but it is not bedside nursing. To the student, nursing techniques should be presented as incidents in the care of an individual patient. This may, indeed, be what the Working Party had in mind when they recommended case-assignment, but their wish to compress the whole content of the present course into the first eighteen months of training suggests a stronger interest in nursing techniques than in the nurse-patient relationship. The fundamental nursing techniques—such as bedmaking and blanket-bathing (both still badly taught), aseptic precautions, care of the skin, the giving of an enema, the management of the bedpan, and the feeding of patients—remain the same in all the general and special departments; they could even be taught to a nurse on a single patient, provided his illness lasted long enough for her to acquire deftness and skill. The special techniques—preparation of trays for various medical and surgical procedures, theatre work (which for the student nurse is mainly charing), and the nursing measures appropriate in the special departments—are less important because they are not part of the patient's daily bread. They can be taught quickly to a nurse who knows her business in other ways, but they cannot be properly taught to a student who is still fumbling over basic principles. The King's Fund insist that a love of caring for sick people has always been the main incentive to women to take up nursing and accept its rigours; and, while it is right that the rigours of the life should be tempered, the incentive should be left untouched. The present nursing training often destroys that incentive in the early months: will the course proposed by the Working Party preserve it? The test should be the extent to which the reoriented training allows the student nurse "the deep satisfaction of feeling that she is becoming responsible for the well-being of her patients, with some degree of continuity and with steadily increasing skill." The Working Party's scheme does not seem to offer her this satisfaction.

The King's Fund have been able to add an important new study to those published in the report. Wastage of recruits during the early months of training, they point out, can fairly be regarded as the result of a protracted method of selection rather than as wastage of potential nurses. A girl must spend a few weeks or months in deciding whether she is really fitted for nursing, and she commonly makes the decision during or at the end of preliminary training, or during her early months in the wards. Besides the loss of nurses during training, however, there is a "serious and increasing outflow" of nurses from hospitals shortly after their training ends, to which the Working Party gave little attention. The King's Fund have analysed the movement of 176 State-registered nurses on the completion of their training, with the following results:

No less than 51 (39 on marriage) gave up nursing (29%); 10 entered non-hospital work in private nursing, industry, &c. (5·7%); 3 went abroad (1·7%); 8 went into the Services (4·6%); 74 became pupil midwives (42%); and only 30 entered first employment in hospitals (17%).

They conclude that of the 9300 qualifying each year probably not more than 5000 enter first employment in hospital. The Working Party's hope of building up, within five years, an additional force of 24,000 trained nurses in the hospitals from among the newly qualified is therefore poorly founded: the King's Fund think it would take ten years at least, and other estimates put it at twenty. In the absence of an adequate body of trained staff in hospitals, student status on the lines contemplated in the report cannot be introduced on any general scale; it would transfer the routine nursing load from juniors to seniors, and might lead to a further decline in the numbers of qualified nurses willing to remain in the hospital service. But the King's Fund are uneasy about this "student status." If in using the term the Working Party mean that the student's experience during training should be arranged according to her educational needs and not dictated by the staffing needs of the hospital, all will agree; but not if they see the student purely as an extra, inessential to the work of the ward.

The apparent impossibility of getting enough trained staff within a reasonable time seems to the King's Fund a strong argument against shortening the nursing course to two years, since "the loss from hospitals which occurs at the end of the third year would occur at the end of the second year." (Actually, the Working Party's proposal is for a three-year course, the third year—on which permanent registration depends—being spent in supervised practice.) The length of a course of training should in our view be dictated by its appropriate content, not by extraneous considerations. While we think the Working Party have tried to compress too much technical teaching into too short a period, we still maintain that real

1. Comments on the Report of the Working Party on the Recruitment and Training of Nurses, submitted to the Minister of Health. Obtainable (free) from the Fund, 10, Old Jewry, E.C.2

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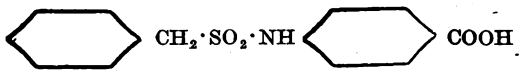
bedside nursing—training in the nurse-patient relationship, and in the fundamental nursing techniques—could be taught, and well taught, in two years to girls of a wide range of ability; and that such a training would well fit an intelligent girl to go on to senior courses in the more technical branches of nursing.

The extravagant loss of newly qualified nurses from hospital can possibly be countered in other ways. Most of those, in the King's Fund analysis, who gave up nursing altogether did so in order to marry. So far the idea of employing qualified married nurses on a part-time rota in training schools has never been considered; but that might be one way of building up the trained staff on which student status depends. It is easy enough to say that full-time resident staff are more satisfactory. So they may be. But we are nursing bankrupts: we must use the resources we have and use them fully and thankfully. Many young married nurses might be willing to work four hours a day in familiar wards; and some whose children have reached school age might care to go back to their own hospital for part of the day. Again, of the 42% of newly qualified who left hospital to take a midwifery course probably very few meant to practise as midwives: the demand of employing authorities that many nurses other than midwives should hold a midwifery qualification wastes the hospital's staff, the nurse's time, and the country's money. While these two channels of loss could surely be much narrowed, incentives to stay in hospital might well be enlarged. The King's Fund suggest that grants and research awards would be proper inducements to keep ward and departmental sisters at their posts, that the salaries of ward sisters and staff nurses should be adjusted appropriately, and that there should be no maximum for ward sisters which keeps their salary below that of other ranks of senior staff. They also think trained staff should be offered more opportunities of living out of hospital, that any training scheme should be avoided which transfers pressure of work and junior-employee status from students to trained staff, and that hospitals should not be allowed to economise by keeping their establishment of trained staff too small. All this, as the godparents say, we steadfastly believe.

Penicillin Excretory Blockade

INTERFERENCE with the metabolism or excretion of drugs may give rise to harmful or useful results. The barbiturates provide two examples of the harmful kind—the prolonged narcotic effect of thiopentone when given intravenously in patients with impaired liver function, where the normal destruction in the liver is delayed or abolished; and the greatly enhanced sedative action of phenobarbitone in some cases of renal failure, where its excretion is retarded. With the sulphonamides it has been possible to vary the chemical structure of the drug itself so as to delay excretion and obtain higher blood-levels for longer periods. Lately the ingenuity of pharmacologists has been applied to the problem of penicillin excretion, for one of the major disadvantages of penicillin as a therapeutic agent is the rapidity with which the human kidney excretes it from the plasma into the urine. Where there is a normal relationship between glomerular filtration-rate and renal plasma-flow, the penicillin filtered at the glomeruli represents, in man, about 20% of the total amount excreted per unit time. Conversely, of the penicillin excreted by the kidney, 80% is eliminated through the renal tubules.[1] The task is to control this tubular excretion.

Attempts have been made to slow up the excretion of penicillin by giving other drugs at the same time. Diodrast (diiodopyridone acetic acid diethanolamine) was partly successful[2] and *p*-aminohippuric acid rather more so.[3] Unfortunately, however, *p*-aminohippuric acid is ineffective by mouth and has to be given intravenously in doses of 200–240 g. daily; in the concentration required it has a sclerosing effect on veins, so it cannot be continued for long periods. In view of these limitations, BEYER in the U.S.A. has sought a new approach to the problem. The transport mechanism for the excretion of penicillin, like the differentiating mechanism for glucose, is a remarkably selective process, depending on the viability of the tubular epithelium. If, therefore, a substance could be found which would reversibly and selectively inhibit the transport mechanism for the excretion of penicillin, without impairing the vitality of the cells or necessarily abolishing other transport systems, the only remaining pathway for penicillin excretion would be by glomerular filtration, which would represent only about 20% of the normal rate of penicillin elimination by the kidney. BEYER and his colleagues have reported the pharmacological actions of such a substance, 4′-carboxyphenylmethanesulphonanilide, which they have named 'Caronamide.'*



Unlike diodrast and *p*-aminohippuric acid, which compete with penicillin on a mass-action basis for the common transport mechanism of the renal tubular epithelium, caronamide does not appear to be excreted by the tubules; it is believed to suppress penicillin excretion by blocking the specific enzyme transport system responsible for the passage of penicillin through the tubular cells. Because tubular elimination is not a factor in caronamide elimination this substance remains in the blood for a longer time than either diodrast or *p*-aminohippuric acid. Since caronamide is rapidly absorbed from the gastro-intestinal tract it can be given by mouth, in intermittent doses, to suppress the excretion of penicillin. There is a superficial similarity between the structural formula of caronamide and of penicillin II, but caronamide inhibits the renal elimination of all four types. It is worth noting that the simultaneous administration of caronamide does not interfere with blood-penicillin assays (agar cup-plate method). Further, sulphonamides, which may be used in conjunction with penicillin, are not antagonised by caronamide in reasonable therapeutic doses. Against ordinary laboratory strains of bacteria caronamide has little or no bacteriostatic effect, but so greatly does it raise the blood-levels produced by a given dose of penicillin that VERWEY

1. Beyer, K. H. *Science*, 1947, **105**, 94.
2. Rammelkamp, C. H., Bradley, S. H. *Proc. Soc. exp. Biol., N.Y.* 1943, **53**, 30.
3. Beyer, K. H., Flippin, H., Verwey, W. F., Woodward, W. *J. Amer. med. Ass.* 1944, **126**, 1007.

* Caronamide is made in the U.S.A. by Sharp & Dohme Ltd., who hope to begin manufacture in Britain this year.

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and MILLER [4] report a 6–16 times enhanced effect (calculated from survival percentages) of intramuscular penicillin in mice infected with pneumococcus type I and a fourfold enhancement against *Bact. typhosum*.

The few therapeutic reports so far published are equally encouraging. LOEWE and colleagues [5] have treated 9 cases of subacute bacterial endocarditis with penicillin and caronamide simultaneously. In this condition high penicillin blood-levels must be maintained for many weeks. The penicillin was given continuously for eight weeks by the intravenous route, made possible technically by the use of heparin, and caronamide was given by mouth for from two to nineteen days. Enhancement of penicillin blood-levels was obtained in every case taking not less than 3 g. of caronamide four-hourly, the increase being twofold to sevenfold in different cases. Some slight toxic effects were encountered; all but one patient had a mild and transitory renal disturbance, with albumin and occasional red cells in the urine. There is apparently no interference with renal function as indicated by the elimination of blood-urea nitrogen, creatinine, and uric acid,[6] but further work is required to prove that there is no permanent kidney damage when caronamide is given for weeks at a time. Since caronamide is precipitated in an acid urine (below pH 5·5) it may be desirable to alkalinise it, and certainly to maintain a daily urinary output of at least 1500 ml. while the caronamide is being given. No cutaneous manifestations were seen though these have been reported elsewhere. CROSSON et al.[7] discuss the advantages gained from the higher penicillin blood-levels made possible by using caronamide. They gave penicillin to 6 patients by mouth, to 8 by intramuscular injection of watery solution, and to 3 injected in beeswax and peanut oil. The administration of caronamide by mouth in doses of 2 g. four-hourly raised the blood-levels 2–7 times in each case except when the penicillin was injected with beeswax and peanut oil, when the increase was less.

In caronamide we clearly have a valuable adjunct to penicillin therapy. It can readily be given by mouth, and doses of 2–3 g. four-hourly will enhance penicillin blood-levels to a valuable extent. A concentration of 30–50 mg. of caronamide per 100 ml. of plasma is sufficient to inhibit the tubular excretion of penicillin; a method for determining caronamide concentration has been worked out,[6] but it is only accurate within 10–20%. Little is yet known about the optimum concentration of penicillin in the blood for therapeutic purposes. A level of 0·03 unit per ml. of plasma is effective against many infections due to penicillin-sensitive organisms, but against less sensitive organisms or against those out of reach of the drug, as in subacute bacterial endocarditis, caronamide may well mean the difference between success and failure, besides effecting a useful saving in penicillin. The use of caronamide to increase the blood-levels when penicillin is given by mouth deserves investigation. In cases where absorption is adequate caronamide will doubtless be of value, but it is the case which gives a poor blood-level response to oral administration in which caronamide may fail. When we know more of the factors involved in the absorption of penicillin from the gut, it may be possible, with the aid of caronamide, to extend the scope of oral administration to cover most of the conditions susceptible to penicillin therapy.

4. Verwey, W. F., Miller, A. K. *Proc. Soc. exp. Biol., N.Y.* 1947, **65**, 222.
5. Loewe, L., Eiber, H. B., Alture-Werber, E. *Science*, 1947, **106**, 494.
6. Boger, W. P., Kay, C. F., Elsman, S. H., Yeoman, E. E. *Amer. J. med. Sci.* 1947, **214**, 493.
7. Crosson, J. W., Boger, W. P., Shaw, C. C., Miller, A. K. *J. Amer. med. Ass.* 1947, **134**, 1528.

Working Together

LIKE the giant Briareus, the big medical institution of today has a hundred hands serving one body; and as the hands multiply in number and specialise in function it becomes ever more necessary to ensure that each knows what the others are doing. In actual practice the functional unity which is the mark of a successful group is seldom attained without frequent personal contact between its members. Where the group is large and heterogeneous—as in a university department extending perhaps over several hospitals, laboratories, and teaching units—this contact is particularly difficult to achieve, and particularly necessary. Hence the integrative technique now being developed by the department of surgery in Edinburgh deserves study with a view to application elsewhere.

As in other university cities, surgery in Edinburgh has a complex structure, based on the voluntary hospitals, the municipal hospitals, and the university itself with its three chairs and its research institute. The fact that different surgeons work in different places under different administration and with different systems of remuneration does not make for a feeling of corporate responsibility either towards patients or towards students; and besides the divisions imposed by history and geography there are the newer divisions of surgery into specialties which are apt to absorb a man's whole time and thought. Against this, medical Edinburgh has long been fortunate in having leaders determined to break down useless barriers, and in the years preceding the war they succeeded in bringing the municipal hospitals into the university picture. Today, in the surgical department, there are units for general surgery and urological surgery at the Western General Hospital, a thoracic unit at the Eastern, and plastic and neurological units at Bangour; and under the direction of specialist professors or senior lecturers these have become flourishing centres of teaching and research. Also there is a lecturer in pædiatric surgery at the Royal Hospital for Sick Children, and a lecturer in anæsthesia. The fact that the two senior surgical chairs (previously occupied by Sir JOHN FRASER and Sir DAVID WILKIE) are at present held by one man makes for closer association of these outlying units not only with the old-established surgical firms at the Royal Infirmary and other voluntary hospitals but also with the Wilkie research laboratory, which, under the charge of the lecturer in experimental surgery, affords facilities for research and offers help with surgical literature and with the preparation and illustration of case-records and of papers for the press. More specifically, Prof. J. R. LEARMONTH—influenced perhaps by his American experience—has sought to promote the corporate sense by starting regular gatherings of surgeons for particular purposes.

In the first place a board of surgical studies has been set up, whose meetings can be attended by any

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teacher, senior or junior, from any teaching hospital, as well as by non-surgical notables such as the dean of the medical school and the director of postgraduate studies. After talking together over tea, the members range themselves round a table to consider first the business brought before them by the regius professor as convenor. This will include, for example, any proposed changes in the curriculum, or the disappointing performance of a class of students in the examinations, or the syllabus of lectures for the coming year. On all these topics comment from any or all the members is invited and indeed stimulated: they have an opportunity of saying, for instance, whether they think too many lectures in the systematic course have been allotted to Mr. X, and whether some of these could not advantageously be used by Mr. Y. Then at the end of the meeting they can bring forward what Edinburgh calls "any other competent business"; and since each has a chance of expressing his opinions in an informal atmosphere, and decisions are often reached on the spot, everybody on the surgical staff—the general surgeon, the specialist, the anæsthetist, the research-worker—can feel that he is in a position to influence policy. Instead of being solely concerned with the efficiency of his own team, or his individual work, he shares in a collective responsibility for the success or failure of Edinburgh surgical teaching.

On the clinical side contact, criticism, and coöperation are encouraged by departmental meetings on Saturday mornings held successively in each of the various hospitals and other institutions staffed by members of the surgical department. Membership of these meetings is more catholic: they are attended by all the home team, including a few students by way of reward for good work, and by members of other surgical firms and of medical units—especially the juniors, who go frequently. At hospitals the programme, which is provided by the unit visited, opens with a report on all the fatal cases seen by that unit since the previous visit: multigraphed summaries of the cases are handed to all present, and remarks on their management are asked for. After this post-mortem discussion, which can be generally helpful, the meeting turns to a more cheerful subject—the technique of lecturing to students. At each weekly session one of the staff submits to the ordeal of delivering a fifteen minutes' talk on a subject of his choice, precisely as he would deliver it to undergraduates; after which the audience (slightly inhibited no doubt by knowing that it will be their own turn some day) indicate any points at which the lecture has fallen short of perfection. For all parties the time is well spent: the performer may learn of unsuspected faults, while his hearers can benefit perhaps equally from a brilliant performance and from one that is patently less successful. In the concluding part of the programme, in which half a dozen cases and specimens from the unit are demonstrated, the staff enjoy a further and less formidable exercise in the art of exposition.

In drawing attention to these practices lately introduced at Edinburgh we do not suggest that they are new inventions: comparable staff meetings are in vogue in the U.S.A., the U.S.S.R., and elsewhere. In this country, however, their success is something of a novelty. At Edinburgh they have succeeded largely because of the support they have had from the non-professorial teachers of surgery, but in other places initiative on similar lines has sometimes been defeated by failure of participation by busy members of honorary staffs. Let us hope that the National Health Service will provide conditions more generally favourable to such undertakings. The maxim "let not thy left hand know what thy right hand doeth" was certainly not addressed to a surgeon, and is equally inapposite to a group of surgeons or to the staff of a hospital. That our hands should work together has, indeed, become one of the conspicuous needs of medicine.

Annotations

THREE WEEKS

THREE weeks remain before the question of participation in the National Health Service is submitted to a plebiscite of the profession. The British Medical Association's plans for this plebiscite will emerge from the special representative meeting held on Thursday. Meanwhile Dr. Charles Hill has opened the association's campaign, and in an address to the Metropolitan Counties branch (reported on another page) has called for united rejection of the Minister's proposals, primarily on the ground that their acceptance must end in practitioners becoming whole-time salaried servants of the State. His large audience gave its loudest cheer to his statement that the profession is fully entitled to say "no"; but its somewhat restrained attitude suggested awareness that many factors need consideration before an answer is given. In another column a correspondent goes so far as to suggest that from different branches of the profession the answer need not necessarily be the same.

ELECTROPLEXY EXPLAINED?

PSYCHIATRY owes the original technique of electrical convulsant therapy to Cerletti and Bini, who published their first results in 1938. There has since been continued speculation as to how artificially induced convulsions produce their therapeutic effect. In 1940 Cerletti, who is director of the neuropsychiatric clinic of the University of Rome, advanced the hypothesis that electroplexy brings about dynamic, biochemical, and endocrine changes in the diencephalon, and that these are responsible for the cures obtained with the treatment. He held that it is the epileptic coma (however induced) that initiates the changes, and not the passage of the electric current per se. Six years later Jean Delay, evidently unaware of Cerletti's explanation, put it forward again. It is only recently that Cerletti has had a chance to test its accuracy, and in so doing he has opened new vistas of speculation.[1]

Cerletti submitted a number of pigs to intensive electroplexy, allowing them to die from status epilepticus. From the brains of these convulsed animals he made emulsions which he injected at intervals into a number of manic-depressive patients (36 in all). An emulsion of brains from pigs which had not been convulsed was injected into a control group of similar dysthymics. The treated group recovered in a way that might have been expected from a course of electroplexy, while the condition of the control group showed no change. In his next trial Cerletti injected one group of rabbits with an emulsion of brains from "shocked" pigs, and another series of rabbits with an emulsion from "unshocked" pigs; and he then injected rabies virus into the brains of both groups. After the usual incubation period of six days all the rabbits which had been treated with the

1. Cerletti, U. *Lav. neuropsichiat.* 1947, 1.

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emulsion of "unshocked" pigs' brains developed acute hydrophobic encephalitis and died. Of the group that had received injections of "shocked" pigs' brains, some developed the initial symptoms of rabies and later died, while others, after exhibiting mild symptoms, made a complete recovery. The conclusion that Cerletti draws from these surprising results is that intensive electroplexy gives rise to the formation in the brain of substances possessing powerful defensive and vitalising properties; and to these hypothetical substances he gives the name "acroagonins"—from ἄκρος (utmost) and ἀγών (struggle). He believes that when an animal organism is approaching the threshold of death, its brain can quickly elaborate what might be called "S.O.S." substances, which can exert extraordinary restorative powers if given a chance.

If electroplexy cures by the mobilisation of generous supplies of acroagonins, it is arguable that hypoglycæmic coma and electrocoma (electronarcosis) act in the same way. It is even possible to suppose that prefrontal leucotomy sets up a kind of constant "trickle-charge" of acroagonins. If Cerletti's experiments are confirmed, and these substances can be isolated, he will have opened another chapter in psychiatry.

RELATIONS BETWEEN KIDNEYS AND PARATHYROIDS

Dr. J. R. Gilmour's earlier work on the normal anatomy and histology of the parathyroid glands enables him to assess authoritatively the changes in these glands that are secondary to renal disease. It has long been recognised that in the late stages of nephritis they undergo hyperplasia, with associated changes in the bones, but earlier workers have not attempted to discriminate between the increases in parenchyma weight and total weight of the glands. In a book [1] just published Gilmour estimates the parenchyma weight and expresses it as the percentage variation from the mean normal weight in different sexes at different ages. The study is based on a series of 90 cases, including 48 examples of Bright's disease, which are subdivided according to Russell's classification. Cases of pure ischæmic nephritis are excluded because no associated abnormalities have been found in the parathyroids in this condition. Six histological types of parathyroid gland are described, of which type I represents the normal state. Types II and IV include the hyperplastic varieties which seem definitely to be due to renal disease. Type III is transitional and represented by one case only, while types V and VI are forms apparently not due to renal disease. Bright's disease, with few exceptions, is associated with type II or (less commonly) type IV changes. Normal parathyroids are found in nephritis mitis (lipoid nephrosis), and in a large proportion of examples of nephritis repens, type IV. Possibly the latter are representative of malignant hypertension, a condition which receives no place in Gilmour's grouping.

The bones were examined microscopically in 33 cases, and in 20 of the 25 adults osteitis fibrosa was present. It is of interest that no signs of osteomalacia were associated with the disease. No explanation of this is offered; but there is evidence that healing takes place in the bones when the parathyroids become definitely hypertrophied. Clinically, no correlation was found between hypertrophy of the parathyroids and elevation either of blood-pressure or blood-urea; but renal inefficiency was constantly present, and as far as clinical data went the duration of such inefficiency seemed important. Gilmour's book, which bears evidence of long and careful preparation, should rank as a classical work of reference in this particular branch of special pathology.

1. The Parathyroid Glands and Skeleton in Renal Disease. J. R. GILMOUR, M.R.C.P., pathologist, Emergency Medical Service; junior assistant director, Bernhard Baron Institute of pathology, London Hospital. London: Oxford University Press. 1947. Pp. 157. 18s.

SONOGENIC EPILEPSY

REFLEX epilepsy in any of its forms always invites study, because of its dramatic nature and also because it presents an experimental situation in which attacks can be precipitated in fairly well controlled circumstances. Epileptic fits can of course be precipitated by many stimuli, but it is only when these are highly selective that the term reflex is applied. There is no real evidence that the disturbance is a reflex one, unless, as Critchley [1] suggested in his review of musicogenic epilepsy, it is the result of a conditioned reflex. Penfield and Erickson [2] have suggested the term sensory precipitation epilepsy, and this has the virtue that it is merely descriptive and does not involve speculation into causal mechanisms.

Any epileptic subject may have fits in response to emotional states, to pain, or to the sight of blood, or in association with bodily changes such as menstruation, overbreathing, or pyrexia. There are many physical and mental states which will precipitate a convulsion in a predisposed person. But in cases of reflex epilepsy the induced fits arise only in response to a highly specific stimulus. This stimulus may involve an afferent pathway in any of the sensory systems—painful stimulation of a limb, as for instance after peripheral injury; light touch on an abnormal area of skin; proprioception from muscles; opening the eyes to command; the sight of special objects or colours; or the appreciation of special sounds, notes, or tunes. A study of all the effective stimuli makes it clear that in most instances there is an abnormality in the pathway responsible for the afferent impulse. This abnormality may be in the receptor organ, in the peripheral nerve or spinal cord, or, more often, in the central receiving area in the cerebral hemispheres.

Because of the peculiar circumstances which attend the attacks, reflex epilepsy has seemed to offer further scope for the study of the nature of convulsive activity, and the electroencephalogram (E.E.G.) has encouraged this study by providing concrete and measurable evidence of the cerebral changes which follow the adequate stimulus. Williams [3] used an epileptic response which occurred on opening the eyes to command to study the transient disturbances seen in the E.E.G.'s of epileptics; simply because the disturbance, however minute, could be recognised as epileptic if it occurred in the same circumstances after opening the eyes as had its predecessors.

Shaw and Hill [4] have made a comprehensive study of a case of musicogenic epilepsy, and have related the clinical and electroencephalographic changes to visceral phenomena which accompany the onset of the attacks. The patient was a woman who invariably had a psychomotor epileptic disturbance, with corresponding changes in the E.E.G., when she heard music of any kind. The attack, which was undoubtedly epileptic, was preceded by a good deal of emotion, but Shaw and Hill show that the fit was not determined by the changes in cardiovascular or respiratory function which preceded it. In their case there was evidence of dysfunction of one temporal lobe, which further supports the general rule that in cases of reflex epilepsy there is an organic disturbance of function somewhere in the "reflex" path—often at its central connexions. It also reinforces Critchley's view that in most cases the primary change in response to music is an emotional one. It may well be that in other cases of sonogenic epilepsy the preci-

1. Critchley, M. *Brain*, 1937, **60**, 13.
2. Penfield, W., Erickson, T. S. Epilepsy, London, 1942.
3. Williams, D. *Brain*, 1944, **67**, 10.
4. Shaw, D., Hill, D. *J. Neurol. Neurosurg. Psychiat.* 1947, **10**, 107.

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pitant is emotional, but there seems to be a group in which a particular sound or musical note will induce a fit. This was true of the man who had his fits in response to the first word of the declaration "Here is the news" as it came over his radio; such also is the case in the mice who have fits in response to a high-pitched note. These days the news may well induce a change in emotion, and Lindsley[5] showed that the mice with sonogenic epilepsy became excitable and hyperactive before the onset of the fit. It may therefore be the stimulus which arouses the required emotion which is specific and not the direct relationship of the stimulus to the fit.

Much of the experimental work on epilepsy based on changes in the E.E.G. now makes use of the tendency of some people to respond to highly specific situations with epileptic outbursts. These cases are sufficiently rare to excite the clinical collector, but when they are recognised they also excite the experimental worker, for they provide a stereotyped train of events which can be repeated at will, in a disease where progress is restricted by the uncertainty of its manifestations.

ADDICTION TO AMIDONE

EXPERIMENTS in animal and human subjects have led Isbell et al.[6] in the United States to class 'Amidone' as a drug of addiction. This synthetic analgesic, *dl*-2-dimethylamino-4 : 4-diphenylheptane-5-one, which is also known under its original German name amidon, and its trade names 'Physeptone,' 'Miadone,' 'Dolophine-Lilly,' and 'Methadon,' suppresses the morphine abstinence syndrome and will take the place of morphine in morphine addicts. Apart from its effects in addicts, amidone does not produce euphoria, and cancer patients given the drug for periods of 3 weeks to 6 months showed either no symptoms or mild ones after it was withdrawn. Nevertheless Isbell and his colleagues believe that, unless the manufacture and use of amidone are controlled, addiction to it will become a serious public-health problem; and, as announced in our news columns, the drug has now been brought under the Dangerous Drugs regulations in Great Britain. 'Metopon,' the other addition to the D.D.A. list, is at present unobtainable in this country.

ARTIFICIAL RESPIRATION

THE late war brought a quickened interest in the methods and results of artificial respiration, and in an address last week to the anæsthetics section of the Royal Society of Medicine Dr. E. A. Pask was able to describe notable advances. When placed in an atmosphere of helium or nitrogen, and thereby deprived of oxygen, a man first hyperventilates, and thus reduces the carbon-dioxide tension of his blood. But experimentally it has been found that animals dying under such conditions have a high carbon-dioxide tension, the reason being that respiration has gradually failed before death. With asphyxiation, Dr. Pask said, artificial respiration should continue for at least half an hour. In most emergencies carbon dioxide plainly has no place in treatment during apnœa; but once the patient starts breathing again there is much to be said for having him breathe deeply, especially in carbon-monoxide and carbon-tetrachloride poisoning. All the common methods of artificial ventilation have been shown to give satisfactory ventilation, and the method should perhaps depend on the environment and on the training and intelligence of the person administering it. No method seems to be much better than others in dealing with a sluggish circulation, and probably no patient can recover after effective cardiac beats have stopped for a couple of minutes. Nevertheless experiments on deeply anæsthetised subjects have shown that with some methods the oxygen uptake is very much greater than with others; indeed, even where ventilation is greatest, oxygen uptake may be least. These differences in Dr. Pask's opinion are probably attributable to some effect on the circulation.

5. Lindsley, D. B. *J. Neurophysiol.* 1942, **5**, 185.
6. Isbell, H., Wikler, A., Eddy, N. B., Wilson, J. L., Moran, C. F. *J. Amer. med. Ass.* 1947, **135**, 888.

NEW YEAR HONOURS

A LIST of medical recipients of New Year honours appears on another page. It is headed by the name of Sir Edward Mellanby (G.B.E.), who not only holds one of the most important posts in medicine but remains a distinguished investigator in his own right. Lieut.-General T. O. Thompson (K.C.S.I.) and Major-General Robert Hay (K.C.I.E.) were respectively the last director of medical services, India, and the last director-general of the Indian Medical Service: it was their task to write the end of a long and fine chapter, and we are glad to know that General Thompson has gone back to India as Red Cross commissioner to help in opening a fresh one. A third Indian knighthood is that of Colonel David Clyde, late surgeon-general with the government of Bengal. Nearer home, special pleasure will be felt at those bestowed on Dr. John Parkinson of the London Hospital, and Prof. Harry Platt of Manchester. Dr. Parkinson has lately made great efforts to improve the management of the rheumatic child: esteemed far and wide as an outstanding representative of British cardiology, he has a more private reputation for skill in water colours and gardening. Professor Platt, like Dr. Parkinson, is well known in the United States, and he brings both sense and imagination to many subjects besides orthopædics. He is adviser in that subject to the Ministry of Health, and a member of the Spens Committee on the remuneration of consultants. We are glad to be given an opportunity of congratulating these and other colleagues on the good work which is now formally recognised.

COMPULSORY RECRUITMENT TO THE FORCES

THE Central Medical War Committee has been notified by the Ministry of Health of changes, from Jan. 1, in the arrangements for calling up doctors. Compulsory recruitment of practitioners as general-duty medical officers is now confined to those under the age of 26, unless the committee agrees (or has already agreed) to postpone call-up beyond the 26th birthday on the ground that the doctor is undergoing or is about to undergo training for the purpose of acquiring further qualifications or special experience. In this event the doctor is liable for compulsory recruitment as a general-duty officer until he has reached the age of 30. The compulsory recruitment of doctors for service with the Forces as specialists or graded specialists is now confined to those under the age of 35.

CHOLERA IN EGYPT

IN a leading article on Nov. 27, objecting to some of the measures taken by various countries to prevent the spread of cholera from Egypt, we said: "It was also unfortunate that there was delay on the part of the British military in notifying the Egyptians of four cases in the Canal Zone." We have now ascertained that though there was considerable delay before the news of these Canal Zone cases reached the World Health Organisation's epidemiological bureau at Geneva, there is no reason to suppose that the British authorities were responsible for it; and we are in fact assured that in these cases the interval between diagnosis and notification to the Egyptian public-health service was never more than four days. We are glad to publish this correction, and to add that during the whole epidemic close liaison was maintained locally between British military hospitals and civil health authorities, and centrally between the medical directorate, M.E.L.F., and the Egyptian ministry of public health.

Major-General NEIL CANTLIE has been appointed Director-General of Army Medical Services in succession to Sir Alexander Hood, who retires on April 1.

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Modern Hospitals

II

CHILDREN'S CLINIC, HELSINKI

ARVO YLPPÖ
D.M.
PROFESSOR OF PÆDIATRICS, UNIVERSITY OF HELSINKI, FINLAND

THE first children's clinic, the Hôpital des Enfants Malades in Paris, was built in 1802. The wards were large, and the results, as in other hospitals of similar design built later, were not good. Gradually the opinion gained ground that the children who died in these hospitals were killed less often by the disease for which they were admitted than by other conditions which they contracted after admission.

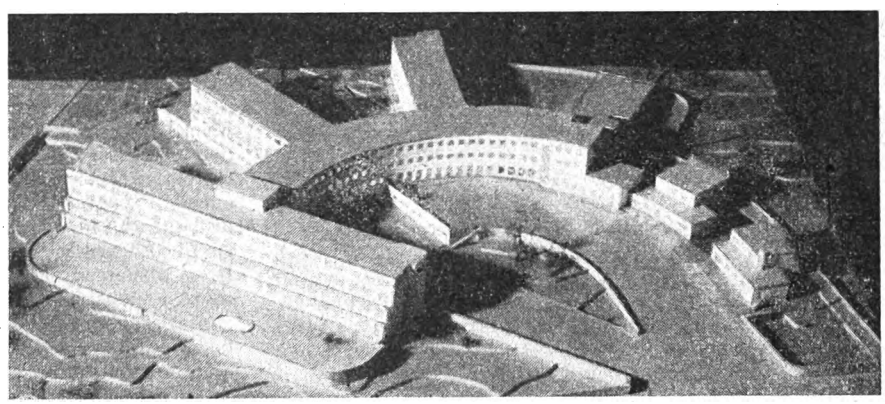
EARLIER EXPERIMENTS

A revolutionary change in the construction of children's hospitals was wrought by Professor Rauchfuss, of Leningrad. Working on the principle of decentralisation, he planned a hospital divided into small pavilions, with a separate pavilion for each of the epidemic diseases of childhood. The great St. Vladimir Hospital in Moscow was constructed to this pattern in 1875, with a number of pavilions centred round one large building; and all the bigger children's hospitals at the end of the last century and at the start of the present century were designed in the same way. But this design proved very uneconomical because, with the normal fluctuations in the various epidemics, some of the buildings were often empty.

Infants were not admitted to children's hospitals until the beginning of this century. A new problem then presented itself in the need to prevent the spread of respiratory and intestinal infections. Their prevention, which is even more difficult than that of the acute epidemic diseases, was achieved by the construction of special isolation wards for the care of both infants and older children. Thus for the twenty years or so between about 1910 and 1930 the ideal children's hospital consisted of a large central building and a separate isolation department for doubtful and clearly infectious cases. Children with true epidemic diseases, however, were no longer admitted to children's hospitals; instead they went to infectious-diseases hospitals, which accepted both adults and children.

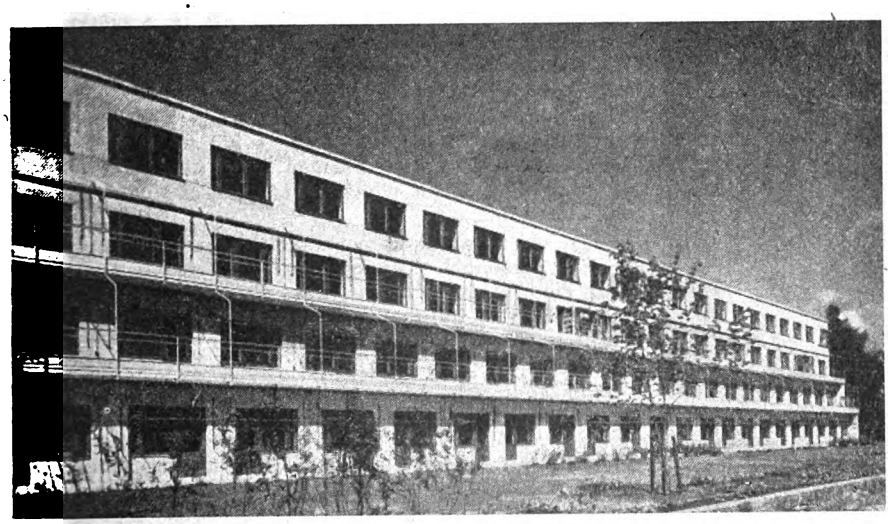
TEACHING REQUIREMENTS

This division of children's diseases into two distinct groups—epidemic diseases, treated in fever hospitals, and other diseases, treated in children's hospitals—may be advisable in very large cities, but it has many disadvantages. Firstly, there is always a risk of epidemic disease breaking out in the wards of a children's hospital; and if the hospital has not got its own isolation department, cases must be sent to another hospital. Secondly, children's hospitals are the acknowledged centres for training children's physicians and nurses; and, since experience of infectious diseases is an essential part of this training, a hospital without an isolation department is not a suitable training-place.



Model of the clinic.

During his training years a children's physician must learn about not only the sick but also the healthy child, studying its development and ways to keep it well. This is possible only if the clinic is closely associated with a child-welfare centre, to which mothers bring their healthy young children. Here the junior physician can learn about the physiology of healthy children, including their feeding, and about the prevention of disease—in short, social and preventive pædiatrics.



The terrace-façade.

GUIDING PRINCIPLES

If he is to remain well, a healthy child must have sunshine and fresh air. For the sick child these are still more important, yet he seldom receives these natural remedies. During the war, despite difficulties, we built in Helsinki a new children's clinic, which was opened in the summer of 1946. In designing it we were guided by the following aims: (1) to minimise the risk of infections—including influenza and bronchitis—being spread from ward to ward and from child to child; (2) to provide fresh air for every infant and child by constructing open balconies reached directly from the wards; (3) to organise a training-centre, where future

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physicians and children's nurses could become acquainted with all kinds of children's disease, including epidemic disease, and with methods of care for premature and other children.

The clinic, which is both hospital and university training school, has 13 wards, with altogether 350 beds. The departments are grouped as follows:

1. A ward for premature infants and healthy children fed by wet-nurses. About 10% of all children in Finland are born prematurely (i.e., weighing less than $5^1/_2$ lb.); the mortality among them is extraordinarily high, amounting in some years to 50% during the first year of life.

2. Wards for other infants.

3. Wards for children of play and school age.

4. An isolation department for children with doubtful diagnoses and with acute respiratory and intestinal disturbances.

5. Surgical wards for infants and children. (Here it may be noted that an infant submitted to operation must have special care from persons with pædiatric training.)

6. A special isolation ward, receiving children with all kinds of infectious disease from other wards as well as from outside the hospital.

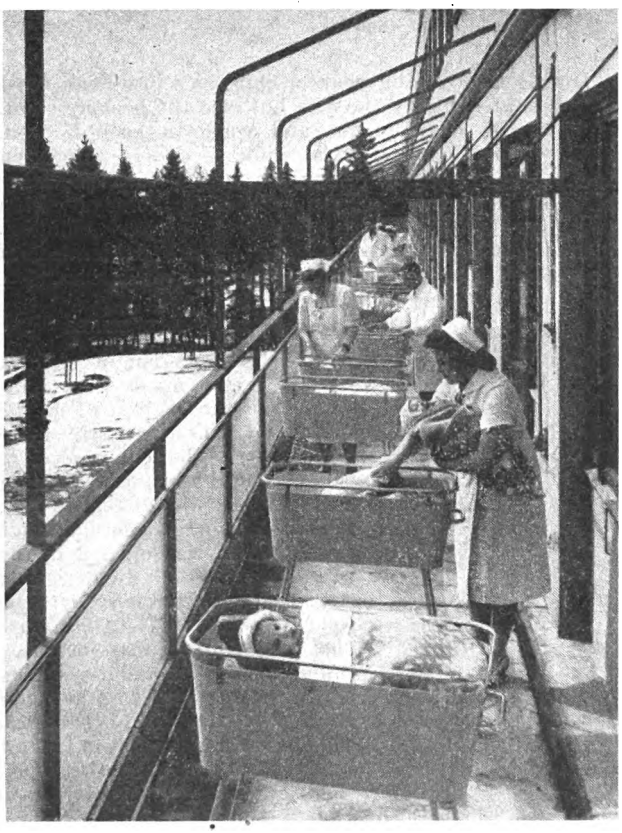
7. An outpatients' ward.

8. A child-welfare centre.

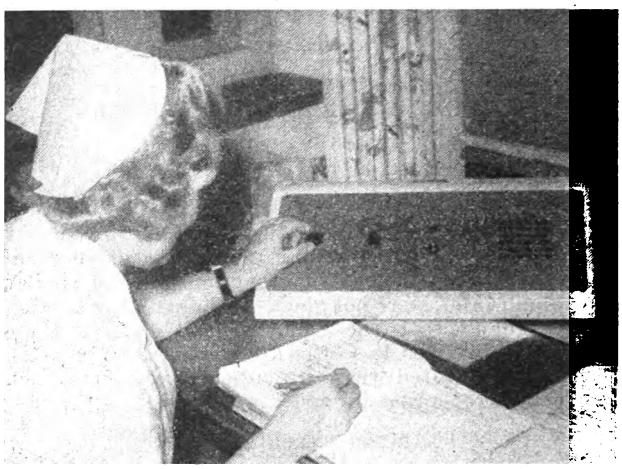
9. Laboratories, and X-ray and physiotherapy departments.

10. Milk and diet kitchens for children.

11. A mother's milk centre. Here the surplus milk from healthy mothers outside the hospital is collected. This milk, and that of wet-nurses who live in the hospital, is used for young infants with serious intestinal and other alimentary disturbances.



A ward balcony.



The nurse on duty keeps the wards under observation by means of microphones and a loudspeaker.

DESIGN OF THE HOSPITAL

The lay-out of the hospital resembles a hand with spread fingers. This strange form derives from our attempt to combine features of the pavilion and the block systems. Each finger can function as an independent hospital; but from them it is easy to reach the laboratories and the administrative offices in the curved central part of the building. It would be difficult and inconvenient in our cold climate to transport small patients to the laboratory or the X-ray department from dispersed pavilions, which in any case are much more expensive to build and operate. No part of the clinic is of more than four stories. The tall block, now fashionable, was avoided because lifts involve many dangers for young children and because infection tends to spread more readily in a high building.

The building was divided to prevent the spread of infections; and in this respect the design has proved its worth. For this purpose, too, the wards are small. Each ward-unit has several rooms for 1–2 children, and no room takes more than 6. Glass walls between the rooms enable nursing sisters to observe simultaneously the patients in several rooms, and to supervise the work of probationers.

The terrace-façade was built so that every infant and child could be taken directly from its ward to a balcony. Owing to the recession of balconies above each other wards on the lower stories are larger than those on the upper. In a children's hospital this is a convenient arrangement; bigger children, who need more floor-space, are accommodated in the large lower wards, and infants in the higher stories.

The difficult problem of ventilation has been met by a system which draws spent air from the wards, while compressed and warmed fresh air is released in the corridors, from which it is diffused to the rooms on each side.

The electrical equipment includes a call-system for finding personnel. Microphones are fitted in the wards and connected with the duty-sister's room. This is particularly helpful at night, when a single nurse, by turning a searcher-switch, can hear voices or other sounds in a number of different rooms.

Our clinic has been designed on the principle that the children's hospital, with its specialist doctors and nurses, must include every kind of medical care for sick infants and children. The modern children's hospital should also have departments, such as an infant-welfare centre and a mother's milk centre, representing preventive pædiatrics.

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Special Articles

"THE MINISTER'S REPLY"

ADDRESS BY SECRETARY OF B.M.A.

ON New Year's day the great hall of B.M.A. House was again filled to overflowing when Dr. CHARLES HILL, secretary of the British Medical Association, addressed the Metropolitan Counties branch on the Minister of Health's reply to the Negotiating Committee.

The reply, he said, had a preface couched in seductive tones; but their softness must not be allowed to obscure its real character. The Minister said that all general practitioners are free to enter the service or not; but with the Act in its present form the only alternative for many of them would be to enter or to starve. The word "service," the Minister suggested, is a misnomer; yet it was the word he himself used in his Act. Though members of the service would not be civil servants they would be salaried officers of an agency of the State, and they would be entering a service administered by civil servants.

DISTRIBUTION

Under the Act doctors who are new to general practice, and those who wish to change their area, would have to obtain the sanction of the Medical Practices Committee. The association held that the general practitioner should be free without anyone's permission to set up in public practice in the area of his choice. With capitation fees payable for every member of the community, errors in distribution would generally correct themselves; but in places where special measures prove necessary the association would not oppose them. To justify interference with distribution, Mr. Bevan argued that no doctor in the public service can be allowed to attract public money to practice in areas where the public interest does not warrant it, implying that the doctor would increase public expenditure by settling where he is not needed. This would be true, however, only if doctors receive a basic salary. The Minister, doing its work in advance, said that the Medical Practices Committee will find only a few areas under-doctored. For the sake of better distribution in these few areas he was setting up a system for licensing general practice. He argued that the system will not prove cumbersome, since the committee will be able to keep in touch with the situation everywhere. Dr. Hill appealed to his vast audience: "this is a meeting of some of the practitioners of London. And the committee is to keep itself informed of the details of all your practices!" The experience of the Central Medical War Committee during the war showed that no committee can discharge such a task.

GOODWILL AND PARTNERSHIPS

The Act, he continued, made the sale of practice goodwill an offence. On the Minister's interpretation partnership agreements remained in force after the appointed day and sale of goodwill under such agreements would not be illegal; but two leaders of the Chancery Bar declared that his interpretation is wrong and that only a proportion of sales under such agreements will be exempt from the penal provisions of the Act. They used some significant words:

"If sections 35 and 36 are allowed to become operative without amendment the profession and the Ministry alike will labour under embarrassing uncertainty on matters of great importance until the debatable matters have been finally adjudicated upon, and in the meantime steps may have been taken on the footing of a construction which is ultimately found erroneous with unfortunate consequences to all concerned. In our opinion it would involve a real hardship to the practitioners concerned if they were required to submit to such uncertainty when it has been clearly foreseen and can be removed by an amending Act."

Counsel then went on to show that the Minister is incapable of putting his own interpretation into operation and of paying interest on the compensation moneys due to individual practitioners. To all this Mr. Bevan replied: "If in the future I am proved in the courts to be wrong I shall introduce legislation to put myself right." But nothing could put right the transactions undertaken in the meanwhile. Under existing agreements (*a*) a doctor who remains outside the service might find himself obliged to buy a partner's public practice, and (*b*) a doctor inside the service might have to buy a partner's private practice —and in each case what the doctor buys would be valueless because it was unsaleable. This difficulty the Minister ingeniously proposed to meet by offering to pay compensation on (*b*) out of savings effected on (*a*). In other words he was saying: "To the extent that I mulct the man outside the service I will compensate the man inside the service." He showed himself impervious to argument, legal or otherwise. He was inviting members of partnerships to join the service without taking the trouble to clarify the position that will arise if they do so. Further, the offences created under the Act reduced the likelihood of doctors forming partnerships and accepting "assistantships with a view."

REMUNERATION

In his estimates of remuneration the Minister had a natural tendency to put first the highest figure, showing what a practitioner will earn if he has 4000 patients on his list. In a service which is free of charge and covers the whole population the number of items of service per patient would rise. But even taking the conservative figure of 5 items per annum, a list of 4000 would mean 20,000 items—e.g., over 100 a day in winter and up to 70 in summer. Work at this level was not within everyone's physical capacity. Again, the Minister spoke of various other sources of income but omitted to say that the appointments as district medical officer will disappear without compensation, that the work of police surgeons and Post Office medical officers will contract, and that undertaking midwifery will be inconsistent with having a complete list. In many areas, too, private practice would be virtually non-existent. Actually, of course, the average number on the list would be not 4000 but about 2000.

The Minister had promised to accept the recommendations of the Spens Committee. That committee had said that, at the 1939 value of money, 50% of general practitioners should have net incomes of at least £1300 a year. Increasing this figure by the 30% allowed under N.H.I. to offset the change in money values (which was far too little) and allowing practice expenses at 33⅓% to give a gross figure, the gross income of 50% of practitioners in the service should now exceed £2535. Yet the average man's earnings (for a list of 2000) would be only £1816. Admittedly "50% of practitioners" was not quite the same as "the average man"; but the difference between £2535 and £1816 was substantial. Again, according to Spens, 10% of practitioners should have net incomes of over £2000 pre-war money, which with similar adjustments came to over £3900 today. Yet the man with 4000 on his list received only £3300: giving his whole time to the service he could not get into the Spens 10% group.

Everyone—provided he could increase his list at sufficient speed—was to have a basic salary of £300. The effect of this was that for each of the first 1000 patients the doctor got 21*s*. 2*d*., and for the remainder 15*s*. 2*d*. The more doctors joined, the smaller the capitation fee would be: the fewer the doctors the more the fee. The tapering capitation fee had thus come back in a new form.

RIGHT OF APPEAL

The Minister said he could not be responsible to Parliament for the service if at the bidding of the courts

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he had to retain a doctor who was unsuitable for that service. (The implication here was that even if the courts said that the doctor was innocent the Minister would still believe him guilty.) In the B.M.A.'s opinion membership of the public service should not be denied to any doctor whom the General Medical Council retains on its register as a fit and proper person to practise.

HOSPITALS

Turning to the new administration of hospitals, Dr. Hill admitted that it has some advantages, but expressed his personal regret that it has not been more strongly opposed: "too long have we accepted the view that to transfer something to the State is to ensure that it will be properly conducted." The Act enabled the Minister to establish a hospital monopoly, and by taking over nursing-homes to make independent practice difficult if not impossible. In hospitals there were to be three types of beds—public beds, private beds, and intermediate ones in which the patient pays only the extra cost of amenities. Private consulting practice would be in great peril if it was decided to develop this intermediate type. The assurances of Ministers, who came and went, were soon forgotten. In December, 1939, the presidents of the three Royal colleges wrote in the medical press:

> "There is a suspicion amongst some doctors that the Ministry of Health may be proposing to use the E.M.S. as the thin end of the wedge for a post-war State medical service. We can assure such, on the highest authority, that nothing is further from the Ministry's intention and that all such fears are groundless. It may well be, of course, that after the war economic conditions may make some form of assistance to the voluntary hospitals, by grants-in-aid or otherwise, necessary, but that the voluntary system will continue there is no reason to doubt."

Today another Minister was completely ignoring the conditions on which the profession coöperated in the E.M.S. at the beginning of the war. And under the Act any Minister of Health would be able, simply by regulation, to change the doctor's remuneration, to increase the basic-salary component, to monopolise all hospitals, and to make private practice by consultants almost impossible.

THE CHALLENGE AND THE RESPONSE

"What does all this add up to?" Dr. Hill asked.

> "There is one criterion by which the profession is measuring these proposals—do they or do they not bring us closer to becoming a whole-time salaried service of the State? On that issue I think we can command the support of an overwhelming majority of the profession."

With the general practitioner no longer owning his goodwill, and unable to enter practice without the permission of a Whitehall committee, the Minister would be in a position to decide what proportion of his remuneration should be by salary. Was it in fact inevitable that this will lead to a whole-time salaried service? Here the evidence lay in the policy of the party in power. The Minister himself had picturesquely said that one does not pick fruit when it is green—one waits till it is ripe. The *Tribune* article disclosing confidential information about the discussions and the Ministry's terms had significantly said:

> "Politically the Minister's firmness has been most important. If he had been weak in face of this reactionary profession . . . it would have increased doubts as to the intention to carry out a Socialist programme."

The Minister's proposals were indeed part of a Socialist programme; they were a first step. He had himself said, however, that doctors had a right to decide whether they would enter it: "we are within our rights in saying No." If in the plebiscite a sufficient proportion of the profession would give the necessary undertaking, the Minister would be told in no uncertain terms that he must think again. Practitioners would not be called upon to decline service unless a sufficient proportion of the profession is similarly determined to act with them. There would be no question of discontinuing work in hospital or elsewhere, but consultants would be asked not to sign contracts with the regional boards. (In any case such contracts were most unlikely to be ready for signing till after the appointed day.) If the majority was adequate the period of uncertainty would not be long, and the B.M.A. would take steps to comfort those who give the undertaking. The association had sometimes been blamed for not giving a lead. Well, the lead was now plain. There was no ambiguity. "This thing will lead to our profession becoming salaried servants of the State. In the opinion of the association this thing is wrong, and our profession should stand firm in resisting it."

A year ago the Minister had led people to believe that his mind was open. "I have had it in mind," he said, "that the remuneration of all general practitioners should include an element of salary." He still had it in mind.

The last bulwark of the practitioner would go with the abolition of goodwill. Consultants, for their part, should realise that though the battleground is in general practice, the freedom of one section of the profession is of vital importance to the whole. What was needed was a united profession in which all the elements understand the duty they owe to the public and to the past and future of the profession. Doctors abroad and in the Dominions were watching this country with anxiety as to the outcome.

A PERSONAL VIEW

Four and a half years ago, Dr. Hill said, a meeting was held in the same hall to consider the proposals of a previous Minister, Mr. Ernest Brown, for a whole-time salaried service. Shortly after that meeting the proposals were placed "in the discard." Since then Dr. Hill had not expressed a personal view, but in his four years as secretary he had been in all the discussions, and tonight he would do so once again.

From time to time he had had doubts on one point or another, and difficulty in seeing the wood for the trees. We had been in favour of the discussions of the past year; there was everything to gain and nothing to lose. "But the events of the past few months have made it absolutely clear to me that this means, and is intended to mean, a salaried service under the State." The last chance to reject it had now come. If the service went forward, life would still go on; but medical practice would have lost its character, and its relationship between doctor and patient. These things would be lost unless the profession throws off its inertia and learns a new kind of loyalty—a loyalty that will last until after the appointed day.

Questions

In answering many questions at the end of the meeting, Dr. Hill said that though younger men may think their difficulties will be solved if they can secure practices by merely applying for them, there will be considerable delays: after the death of a single-handed practitioner little practice might be left by the time the vacancy is filled, and a retiring practitioner would not introduce his successor. The newcomer might thus be in the position of a squatter—with whatever relief is given by £300 a year.

A whole-time service, with regular hours, might well afford the individual doctor a more ordered and leisured life—but only at the cost (to the patient) of free choice and continuity of medical care. If the profession put its own material interests first it might choose to become a salaried technical branch of central and local

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government, but in so doing it would sacrifice the satisfactions of work and mind.

Nobody should think that he could enter the service and shortly afterwards retire, drawing his compensation. It would take some years to calculate the share due to each practitioner; and the calculation could never be made at all without the help of the profession.

In Dr. Hill's opinion, the Minister's reason for insisting on the basic salary is that it provides a justification for his proposals to control distribution, on which in turn he founds his case for abolishing the private ownership of goodwill.

In face of a sufficient majority against the scheme, the Minister could not introduce the service; if there were not enough practitioners to run it he would be compelled to postpone the appointed day. National Health Insurance would remain in operation until that day comes. Possibly there might be a period of conflict in which practitioners would provide service on a fee-paying basis; but this, for a time, would not be wholly tragic. Consultants would run no risk of losing their hospital appointments if they refused to sign contracts during the dispute. The Spens Committee on consultants would not report until the end of March, and it was very unlikely that in July any contracts would be ready for signature.

In the plebiscite those who believe in a whole-time service should say so. Those who do not believe in it should also say so, in the assurance that if the majority is large enough the proposal will be rejected. "We've got to get away," Dr. Hill said, "from the mentality that assumes that we are incapable of standing together." This was an issue affecting the profession as a whole. The world outside believed that the profession is firmly knit, and the time had come to prove that in this belief the world is right.

OPINION IN SCOTLAND

AN EDINBURGH MEETING

AN open meeting of the medical profession was held last Sunday at B.M.A. Scottish House, Edinburgh, under the auspices of the City of Edinburgh division of the British Medical Association to discuss the National Health Service Act and consider the profession's attitude. Dr. I. SIMSON HALL presided, and over 350 doctors attended.

Dr. A. F. WILKIE MILLAR, chairman of the Scottish Negotiating Committee, said that there remained only a limited number of points of difference between the doctors and the Government which could be regarded as fundamental. First, the abolition of the sale and purchase of general practices. Many saw in this the first step towards the institution of a whole-time salaried State medical service; but he reminded his audience that at the last plebiscite a majority had voted for abolition. Second, the power of direction. The Act contained no provision for positive direction, and the only criterion of exclusion of a doctor from public practice in any area was that the Medical Practices Committee should be satisfied that that area was already fully doctored. The B.M.A., however, preferred that there should be no element of direction of any kind. Third, the basic salary. The B.M.A. opposed this as the thin end of the wedge of a whole-time salaried service. On the other hand the Medical Planning Commission had originally recommended the principle of the basic salary, and it was also true to say that even if no basic salary were proposed just now it would be perfectly simple for the Government to change from capitation fee to full salary at any time. It was for doctors individually to make up their minds whether these features of the Act presaged the introduction of a whole-time salaried service, to which he took as much exception as anyone else.

Dr. D. S. ROBERTSON said that many doctors welcomed most of the Act's provisions and would regret postponement of the inauguration of the service if major differences developed between the profession and the Government. He maintained, however, that the Act was really two Acts, one on the health aspect and another on political aspects which he held were not essential to the health of the people—e.g., the prohibition of the ownership of goodwill, the basic-salary principle, and the power of negative direction. It was indeed only on these political points that the profession was deeply at variance with the Government. The Labour Party had given out as its policy the introduction of a full-time salaried medical service, and there could be no doubt that some of the provisions were the thin end of the wedge. He emphasised the gravity of the decisions which the doctors would have to take in answering the forthcoming plebiscite. The Government had two weapons—the denial of the right to compensation if a doctor does not enter the service on July 5, and the threat of severe financial loss to practitioners, especially in industrial areas, who do not enter the service. He hoped the whole profession would be loyal to the results of the plebiscite. In answer to a later question, Dr. Robertson said the B.M.A. could never raise a fund sufficiently large to compensate practitioners for loss incurred by refusing service.

Sir HENRY WADE said the present Acts were the culmination of 27 years of commissions, committees, and other planning bodies. Many of the proposals of the Medical Planning Commission were incorporated. Consultants and specialists had all along desired a coördinated hospital service and he felt that on the whole they approved the present provisions. So far as the hospital service was concerned the main difficulty in supplying the public's needs on July 5 was not beds, of which there were many lying empty, nor apparatus of which there was much lying unused, nor yet doctors, but nurses.

Dr. S. J. LIPETZ reminded the meeting that the Ministers had conceded a lot against the wishes of their own party and they should get some credit for this. Whereas it was the declared policy of the Labour Party to introduce a salaried service the Minister had compromised to the extent of making the basic salary only a small part of the general practitioner's remuneration. Originally it had been difficult to see any agreement being reached at all. Now the Act was probably acceptable to the extent of 90% of its content. It was extraordinary that we should be prejudicing the inauguration of the service on the two points of the abolition of sale and purchase and the basic salary when these had been previously decided by the profession. The previous plebiscite had shown 56% in favour of abolition and only 33% in favour of retention of sale and purchase. The Medical Planning Commission had concluded in favour of abolition and in favour of the basic salary.

Dr. W. G. CLARK questioned whether we could be satisfied that nothing in the Act interfered with the doctor-patient relationship, and he looked with suspicion on the provision of hospital beds for consultants' patients who could be charged any fees the consultants liked. Dr. ROBERTSON agreed that this was a sop to the consultants to get them into the service. Dr. HALL said there was a wide diversity in the population and an attempt should be made to provide for diverse needs but only after the basic needs had been met. In answering another question, Dr. Hall stated that at the inception of the service the care of children would remain much as it was at present, with child-welfare clinics, &c., still in operation, but it was expected that gradually the general practitioners would be drawn into the clinic services and take over more and more of this work.

This exploratory and informative meeting closed with the Chairman's statement that at the next general

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professional meeting, to be held shortly, full and free expression of individual views on the National Health Service in all its aspects would be expected and encouraged.

NEW YEAR HONOURS

THE list of New Year honours, announced last week, contains the names of the following members of the medical profession :

G.B.E.

Sir EDWARD MELLANBY, K.C.B., M.D., D.SC., F.R.C.P., F.R.S.
Secretary, Medical Research Council.

K.C.S.I.

Lieut.-General TREFFRY OWEN THOMPSON, C.B., C.B.E., D.M., K.H.P.
Director of medical services, India.

K.C.I.E.

Major-General ROBERT HAY, C.I.E., M.B.
Director-General, Indian Medical Service.

K.B.E.

JOSEPH BERNARD DAWSON, M.D., F.R.C.S.
Professor of midwifery and gynæcology, Otago University.

Knights Bachelor

JOHN PARKINSON, M.D., F.R.C.P.
Physician to the cardiac department, London Hospital.
HARRY PLATT, M.D., M.S., F.R.C.S.
Professor of orthopædic surgery, University of Manchester.
Prof. LUIGI PREZIOSI, M.D.
President of the National Assembly, Malta.
Colonel DAVID CLYDE, C.I.E., M.D., V.H.S.
Surgeon-General with the government of Bengal.

C.B. (Military)

Surgeon Rear-Admiral JOSEPH ALOYSIUS O'FLYNN, M.D., K.H.P.
Major-General STANLEY ARNOTT, C.B.E., D.S.O., M.D.
Air Commodore PHILIP CLERMONT LIVINGSTON, C.B.E., A.F.C., F.R.C.S.

C.B. (Civil)

JOHN JARDINE, O.B.E., M.D., F.R.C.S.E.
Chairman, General Board of Control for Scotland.

C.M.G.

ERNEST MUIR, C.I.E., M.D., F.R.C.S.
Honorary medical adviser, British Empire Leprosy Relief Association.

C.I.E.

Lieut.-Colonel ALFRED INNES COX, O.B.E.
District medical officer, The Nilgiris, and superintendent, Government Headquarters Hospital, Ootacamund, Madras.
Colonel PAUL HERBERT SHELLEY SMITH, O.B.E., M.B.
Inspector-General of civil hospitals and prisons, North-West Frontier Province.

C.B.E. (Military)

Surgeon Captain CLAUDE KEATING, L.R.C.P.I.
Brigadier RODERIC DUNCAN CAMERON, O.B.E., M.C., M.B.

C.B.E. (Civil)

WALTER ALLISON GILMOUR, M.D.
Pathologist, Auckland Public Hospital.
Prof. NORMAN MCOMISH DOTT, M.B., F.R.C.S.E.
For services as director in neurology and neurosurgery, brain injuries unit, Bangour Hospital, Edinburgh.
Lieut.-Colonel ALBERT EDWARD EVANS, M.B.
Medical Chancery visitor, Supreme Court of Judicature.
WILLIAM GORDON MASEFIELD, M.R.C.S.
Lately medical superintendent, Brentwood Mental Hospital, Essex.
GEORGE FRENCH STEBBING, M.B., F.R.C.S. (died Dec. 22).
Member and hon. secretary of the Radium Commission.
JOHN BURKE, M.D.
Medical practitioner, Grand Bank and Fortune, Newfoundland.
ISABEL HUTTON, M.D. (Lady Hutton).
Lately director of welfare, Indian Red Cross and St. John War Organisation.

O.B.E. (Military)

Surgeon Lieutenant-Commander JOHN WARD WALKER, M.B.
Major FREDERICK WILLIAM WHITEMAN, M.B.

O.B.E. (Civil)

Miss HARRIET ELIZABETH ACHESON, M.D.
Vice-principal and professor of obstetrics and gynæcology, Lady Hardinge Medical College, New Delhi.
Major GEORGE KENNETH GRAHAM, M.B.
Lately civil surgeon, Peshawar, North-West Frontier Province.
Major JAMES GUTHRIE, M.B.
Civil surgeon, Tibet and Bhutan.
Mrs. MARGARET STEWART MUNDAY, M.B.
Lately professor of physiology, Lady Hardinge Medical College, New Delhi.
Lieut.-Colonel WALTER SCOTT, M.B.
Civil surgeon, Central Provinces and Berar.
Major ARTHUR MANUS SHERIDAN, M.B., F.R.C.S.E.
Civil surgeon, Lucknow, United Provinces.
Major SAMUEL SHONE, M.D., M.R.C.P.
Superintendent, King George Hospital, and professor of medicine, Andhra Medical College, Vizagapatam, Madras.
Major HAROLD STANISLAUS SMITHWICK, M.B.
Indian Medical Service, Bombay Province.
HOFEEZUDIN SIRAJUDIN MOONSHI, L.M.S.
For public services in Singapore.
THOMAS FRANK DAVEY, M.D.
Medical officer, leprosy service, Owerri Area, Nigeria.
CHRISTIAN WILLIAM FRASER MACKAY, M.B.
Assistant director of medical services, Gambia.
Major CORNELIUS JEFFCOTT HASSETT, M.B.E., M.B.
Civil surgeon, New Delhi.
WILFRED STANLEY WALLIS, M.B.
Rotorua. For services to returned ex-Servicemen.
Miss VICTORIA MARY CROSSE, M.D.
Deputy senior assistant M.O.H., Birmingham.
NICHOLAS KEATING, L.R.C.P.I.
Senior member, South Wales panel, Silicosis Medical Board.
OSCAR REGINALD LEWIS WILSON, M.B.
Principal medical officer, Ministry of Pensions.

O.B.E. (Honorary)

SAMUEL LAYINKA AYODEJI MANUWA, M.D., F.R.C.S.E.
Specialist in the medical department, Nigeria.

M.B.E. (Military)

Major JOHN BISHOP BORTHWICK, M.B., F.R.C.P.E.
Major ROY THOMSON FLETCHER, M.D.
Major IAN ARCHIBALD JACKSON, M.B.
Captain CHEE JUAY POH, L.R.C.P.E.
Flight-Lieutenant THOMAS HARVEY, M.B.

M.B.E. (Civil)

Miss MARGARET KERR MENZIES ALEXANDER, M.B.
Medical superintendent, Christian Rainy Hospital, Todiarpet, Madras.
Captain MORTIMER LAWRENCE AXEN STEELE.
Medical officer, Victoria Memorial Hospital and quarantine medical officer, Bahrain.
Mrs. MARGARET SHEPHERD, M.B., F.R.C.S.
Madras. For medical services.
PUTHENVELIL MATHAI JOSEPH, M.B.
Medical officer, Seychelles Hospital, Seychelles.
JOHN ALAN BENNETT NICHOLSON, M.B.
Medical officer, Nigeria.
Mrs. UNA FRANCES MARIE MARTYN, M.B.
Superintendant, Lady Lyall and Dufferin Hospital, Agra.

Bar to Kaisar-i-Hind Gold Medal

Miss JEAN MURRAY ORKNEY, M.B.
Chief medical officer, Women's Medical Service.

Kaisar-i-Hind Gold Medal

Miss JANE GRANT, M.B.
Medical officer, Church of Scotland, Seoni, Central Provinces and Berar.
VICTOR CLOUGH RAMBO, M.D., F.A.C.S.
Doctor-in-charge, Mission Eye Hospital, Mungeli, Central Provinces and Berar.
BHAGWANT KISHORE SIKAND, M.B.
Medical superintendent, New Delhi Tuberculosis Clinic.
RONALD WILSON THOMAS, M.B.
Medical superintendent, Baptist Mission Hospital, Palwal, Gurgaon District, Punjab.
HERBERT KIRBY, M.D.
Doctor-in-charge, Jorhat Leper Colony, Jorhat P.O., Assam.

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In England Now

A Running Commentary by Peripatetic Correspondents

THERE was a time, I suppose, when the oxyntic cells of the gastric mucosa worked blithely and regularly, untrammelled by a higher command. No doubt they took a great pride in their work—supply and demand for HCl was nicely balanced by that gentlemanly fellow gastrin. But modern civilisation has brought them more and more under the control of a departmental chief with his office in the vagal nucleus, a high-grade civil-servant type responsible to the Minister of Gastric Digestion, who sits in the cerebral cortex. In these hectic and anxious days our minister is driven nearly crazy by the conflicting demands on him; he passes the buck to his departmental chief, who sends out streams of confusing orders by his special telephone wires. Result—the poor oxyntic cells just don't know where they are: they oversecrete, they secrete at the wrong times, they secrete at night (this last is probably the result of an old civil-service order which somebody forgot to cancel, to the effect that "In case of emergency a stated number of oxyntics will be ready for action throughout the night"). The result of this bureaucratic muddle is duodenal ulcer, and the whole body suffers from it. What could be simpler than to cure this by cutting the telephone wires—vagotomy. And how happily the stomach works without its tormenting bureaucratic masters. The relieved oxyntic cells go back to their old ways, the natural laws of supply and demand operate again, the ulcer heals, and the drawn duodenal ulcer face is replaced by a sunny smile. Nowadays a pair of wire-cutters is a very necessary part of the surgeon's outfit.

* * *

Our children will probably remember this Christmas best by the carol party. This was strictly a family concern, except for Dina, our Dutch assistant, who was our undisputed leader. As soon as it was dark on Christmas Eve we set out, candle in hand, to torment our neighbours. To assure ourselves of an audience we led off with a noisy German part-song instructing listeners to awake and pay heed to the crowing cock. Then, more or less in unison, we offered "Stille Nacht," which was followed by a solo rendering of an English carol from Elizabeth, our six-year-old. After a suitable pause the elders took over again with a little Dutch ditty, which goes like this: "The broom, the broom, what are you doing with the broom?" "What do you think I'm doing—the floor." The finale was a cantata (sung *con esprito* and with suitable gestures) relating some harmless incident in a Bavarian local. Too shy to pass over the coin which is usually sufficient to move on other carolers, our friends warmly invited us in for a drink. It seemed that by this harmless blackmail we were all set for the evening, until my missus recalled that the turkey hadn't come. I assured her that the tin of delicious bully-beef would be equally welcome, but in vain. So home we went to harry the butcher by telephone, and to pack the Christmas stockings. The year before Father Christmas had had a bit too much advance publicity and the children had kept watch to greet him; finally at 5 A.M. I had slipped in on all fours while my wife obscured the view by leaning lovingly over each child in turn. This year there was none of that nonsense. We turned out every light, marched boldly in, and left the infants to make what they would of it.

On Christmas morning the continuing tension was eased by the arrival—in a high-powered car—of the butcher, who sent his chauffeur in with the bird. Of course it was all hands on deck. While my wife pottered about laying the fires, making the beds, cooking the dinner, washing up the breakfast things, brewing tea, and keeping a general eye on our three young ones, I played my part by picking brussels sprouts. Fortunately I got some help from our two P.O.W. visitors who arrived bright and early. Perhaps in distributing patronage one takes more than one gives: anyhow the home team enjoyed their day. That evening I asked the elder of our guests if he was happy. He thought a bit, then replied with a smile: "Ich bin zufrieden." Perhaps that's not so bad for a man who hasn't seen his family in six years.

* * *

Nigeria is more than a colony in the accepted meaning of the term; it is really a collection of States, each with its own customs, religion, loyalties, and outlook. In the north you have the Mohammedan Haússa folk, a dignified race strongly Arabic in outlook, with little education but wonderful poise and native intelligence. Their women are kept secluded in purdah, and in consequence the north has produced only one woman doctor and a handful of nurses. The emirs wield the power, under our direction; there are about twelve of them, each supreme in his own province, and the north is exceedingly well disciplined. The north is the country of horses, and playing polo with native teams provides an easy approach to medical problems. Discussions with the emirs and their advisers are held in the dark cool council chambers, with whitewashed walls and huge domed arched ceilings, the council sitting on mats and the emir and myself on regal chairs. Much time is spent in flowery eulogisation of each other; all part of the game—the mashie shot to the problem in hand.

The greater part of the south is well wooded and densely populated—up to 400 per sq. mile—with people of many tribes, Ibos and Yorubas being in the majority. Some of the tribes are very primitive, and cannibalism is still going on. They are all overawed by medicine men with their ju-juism, and in some of the villages the local chiefs showed me their weird images and phallic signs bespattered with blood (I hope animal or chicken). The more advanced tribes are very medical minded and demand N.A.B. for all ailments; the treatment of yaws started this racket, which we call "bum punching," and it is a very profitable source of income to its practitioners.

We are sadly short of medical men. Here is a country of 25–30 million people and there are just over 300 doctors, including medical missionaries and a handful of African private practitioners centred on Lagos. There are several provinces with $1^1/_2$–3 million population and only a single M.O. and perhaps one European sister.

* * *

Why can't I get a secretary like other people's? The contrast between the orderly lines of well-spaced type from my correspondents and the irregular margins, spelling of dame-school standard, and plentiful use of the capital X to which I put my name distresses me daily. When I interview a secretary (and the turnover is rapid) I am ploughed from the start; the ordeal is far worse than any at Queen Square. They all wear their best clothes, smile toothily, and talk of "speeds" which sound astronomical to me. I refuse to have the one whose perfume drives me to open the window or the one who looks as if she had slept in a wet ditch for several nights. I want the average one who can type a letter without more than 10% of all errors combined; who knows your address, Mr. Editor, and the time of the last train to London; who keeps enough paper off my desk to enable me to see a few square inches of wood. A few kind words of advice from the personnel selection experts will be welcome; something like the points of a horse. (I shall have to type this myself or the whole business will start over again.)

* * *

Mr. Allighan has attended my surgery for years as interpreter to his wife, who is deaf. I have never regarded him as a separate being, but merely as an appendage to Mrs. Allighan.

When Mr. Allighan suggested that he too might benefit from a bottle of medicine I was surprised. It must not be too strong, he added, for surely I had heard about his operation. I realised my complete ignorance of this familiar visitor. "Ten years ago," he told me, "I 'ad an operation on the bladder." He paused magnificently. "I 'ad two bladders, and they took away one, and now I only 'av 'alf a bladder." "You had two, they took one away, and now—?" I remarked fatuously. "At any rate," he insisted, rather impatiently, "I now 'av only 'alf a bladder. The roots was growing over the top, and the one bladder was fighting the other as to who was to empty first, and I was passing blood instead of water."

Sinking into my chair, I prescribed the very mildest placebo.

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Letters to the Editor

HEALTH EXAMINATIONS

SIR,—In your issue of Dec. 27 you publish the views of Dr. Macklin and Dr. Parnell, who would have us believe in the value of routine medical examination of the apparently healthy. May I be allowed to comment on this proposal? During the recent war many of us had the opportunity of performing such examinations, and some of us had opportunities of assessing the results, which were, to say the least of it, disappointing. In my hands such an examination soon becomes a meaningless ritual, and it fares little better at the hands of others that I have watched.

This conclusion provoked me to inquire why an investigation regarded as so helpful by some should fail so lamentably in ordinary use. Three reasons were brought home to me. First, the obvious one that the human organism is too complex to be weighed in this simple fashion. Dr. Macklin and Dr. Parnell have armed themselves with chest radiology, and will thus avoid the situation in which I once found myself when it was my duty to discharge from the Service eleven men who had been passed "A1" by clinical examination elsewhere two weeks earlier, but whom the mass radiographers had rejected. Their remarks about "medicals" would make all routine examiners stop and think. Even were all possible diagnostic aids to be added, however, routine examination would still be inadequate for its professed purpose.

Secondly, our training leads us to look for signs in the light of the patient's complaint. If he has no complaints, we have no mental objective in our examination, and, looking for nothing, find nothing. I have records of a man who served for eighteen years with the diastolic murmur of mitral stenosis known to be audible. He was examined annually and in the year of his final breakdown three times, but until he complained of breathlessness and swollen ankles nobody noticed it. Dr. Parnell writes that compulsory examination provides assurance that handicaps are discovered and dealt with. This is not true; there are men who concealed active peptic ulceration and episodes of myocardial infarction and continued to serve in the highest medical category.

My third reason, and it is one that your contributors may help to remove, is our ignorance of the range of normal variation. A fellow undergraduate of mine used to distress himself because his weight was below the standard for his height as laid down on the weighing machine in the Cambridge branch of Woolworth's. I hope that experience has now taught him that healthy men go in all shapes. As a Service medical specialist, I had continually to deal with symptomless men referred for an opinion because they showed some deviation from the textbook normal—the benign systolic murmur and alimentary glycosuria were the worst offenders. Regretfully one is forced to the conclusion that lesions that do not cause symptoms are often best ignored. So why look for them?

If these doctors were merely indulging in one of those harmless rituals that occupy so much of our professional time, I would not be spending mine in writing to you. Much harm ensues, however, if the public are taught to rely on these examinations. The eleven disillusioned recruits alluded to above brought contempt to the medical branch. So also does the man who dies of coronary thrombosis the day after his "medical." Unless we explain the limitations of clinical examination we are bound to bring discredit on ourselves; and who, knowing the limitations, is going to submit himself to examination?

Few of us are honest enough to admit that our chosen activity is in vain; and what we have learned to do with technical skill we like to go on doing, be it thyroidectomy or teaching Latin. Let us beware of creating a similar vested interest in routine examinations.

Cheam, Surrey. C. P. PETCH.

COMPULSORY PHYSICAL EDUCATION

SIR,—Many will agree with Dr. Bolton (Dec. 27) on the desirability of increased participation in physical recreations by university students, but it is to be hoped that few will support him in his plea for compulsion. It is extremely doubtful whether physical fitness per se leads to a better, a healthier, or a longer life; we have only the testimony of those who, having a taste for sport, claim to be the better for indulging in it. We have no objective survey of its value, and indeed we cannot have, for the benefits conferred must vary with the individual. Yet Dr. Bolton, who from his experience should be aware of the innate fallacy, writes: "Of two equally erudite professors, the one who plays squash or can dance a foursome reel is the better product." This is unscientific legend and it ill becomes a medical man to perpetuate such dogma. But even if it could be proved that this were so, there can be no justification for the making compulsory of some form of physical activity. And to attempt naïvely to justify this by pointing out that many things are already compulsory is merely heaping wrong upon wrong.

No, Sir, this is not the British way. Let us remember that the great traditions in British sport are due to the efforts of amateurs who were *volunteers*, and let us not forget the Herrenvolk tradition of many Continental universities which was perpetuated in just this kind of way. Encourage athletics by all means, and provide as wide a free choice as is possible; but the day on which compulsion dawns will be a black day in our waning struggle for freedom.

London, W.2. A. MICHAEL DAVIES.

COXA VALGA ASSOCIATED WITH OSTEO-ARTHRITIS

SIR,—During the last thirty years I have come across a few rather unusual cases of osteo-arthritis, and the one that interests me most is an osteo-arthritic hip which shows a definite lengthening of the affected limb.

In ordinary osteo-arthritic hips the affected leg shows an inch or more of apparent shortening, but of course this is merely due to a tilting of the pelvis to enable more weight to be transferred to the healthy leg, plus erosion of cartilage and mushrooming of the head of the femur. Now in a few—fortunately very few—cases one finds a definite lengthening of the arthritic limb. Radiography shows the head of the femur engulfed in the acetabulum, and considerable cartilage destruction, but very few osteophytes. The condition is very painful but the movements are not much impaired.

This would seem to be a form of coxa valga plus arthritis, but even then one would expect the tilting of the pelvis to avoid pain to counteract the coxa valga lengthening. The results of treatment in these cases, even with lactic acid, are most disappointing; and I should be interested to hear whether any of your readers have come across similar cases and have any suggestions as to the cause of the coxa valga.

London, W.1. VERNON HETHERINGTON.

MASS RADIOGRAPHY IN EARLY DIAGNOSIS

SIR,—Dr. Hoffstaedt (Dec. 27) has done a service by again drawing attention to the wasteful use of the mass miniature radiography units.

Anyone working in a chest clinic or sanatorium must be struck by the tragic and often fatal delay that so often precedes the diagnosis of pulmonary tuberculosis. It is insufficiently realised how vital *early* diagnosis is, and that upon success in this sphere largely depends ultimate return to economic and social independence. With the breakdown of the sanatorium system—and with a wait of 6–9 months for admission "breakdown" is not too strong a word—early diagnosis is even more important; for only the earliest cases can have their treatment completed at home and return to work without entering a sanatorium. At present this home treatment is the only means of combating a situation in which institutional beds are at a premium.

Dr. Hoffstaedt's criticism of the way mass miniature radiography is used is, I feel, very just; obviously such expensive and scarce pieces of precision machinery should be used to the best advantage—i.e., to discover the maximum number of treatable cases. Toussaint and Pritchard have already shown that when radiography is used for examination of practitioners' cases *with symptoms* it reveals nearly ten times the number of cases that mass miniature radiography picks up when used indiscriminately as it is today.

I should like also to add my own plea to that of Dr. Hoffstaedt for more propaganda directed towards

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enlightening the layman about tuberculosis. I am sure that it could increase the number of early cases attending the doctor's surgery; and provided practitioners also become more conscious of the necessity for radiography in cases with *even very minor symptoms*, more treatable tubercle would be found. Even the National Association for the Prevention of Tuberculosis confines most of its propaganda to helping the person whose disease is already diagnosed; and most articles on tuberculosis appearing in the popular press stress the wonders of surgery in modern sanatoria, leading the reader to believe that medicine can work miracles with lungs in fact far past healing. The radio has been sadly neglected as a means of propaganda until just recently when the Radio Doctor gave a talk emphasising the importance of early discovery. Similar excellent propaganda appeared in the feature programme, "The Road from Despair," on Dec. 28.

It seems to me that rather than use public money to X ray healthy people, the Ministry of Health might more profitably sponsor an extensive poster, radio, and cinema campaign to persuade persons *with early symptoms* to attend their doctors, who themselves should have free access to immediate and direct radiography for their patients.

The fact that tubercle kills and cripples more persons than any other disease in the age-group now liable to labour direction proves the necessity for such a campaign to help this country during its industrial crisis and labour shortage.

PETER STRADLING
Assistant Physician, Willesden Chest Clinic.
London, N.W.10.

REFORM IN HOSPITALS

SIR,—Having recently spent nearly six months as a patient in a general ward of a London hospital, I was interested in the important article by Mr. Parry in THE LANCET of Dec. 13. May I comment on just two aspects of the inpatient's life—the high spots of his day, meals and visiting hours.

Meals.—I have seen served to patients, even before the war, meals which made me shudder. In the hospital where I was there was never a meal which was not attractively served, appetising, hot, and sufficient. Where this is not so the reasons must be uninterested nurses, incompetent catering and kitchen staff, or bad equipment, and not the present food supply difficulties.

Visiting Hours.—In adult wards (I am not qualified to join in the controversy about visiting in children's wards) restriction of visiting to twice a week is unnecessary and harmful.

I remember in another hospital an actress suffering from pulmonary tuberculosis and diabetes, who, after a few weeks, was told that she must rest in bed for a further few months in the hope that she would become fit for the thoracoplasty that was her only chance. She chose to spend this period at home because, as she said, she needed to see more of her "own kind." She went home, and she went downhill and died. Of course this might have happened anyway, but I believe that if daily visiting had been allowed, so that this patient could have looked forward to seeing some of her "own kind" each day, she could have faced spending this further period in hospital; and she might then have done better.

The benefits of daily visiting to other patients may be less tangible but are nevertheless obvious. I cannot exaggerate the help it was to me to know that I could see family or friends any day.

I had vaguely supposed that the restriction was on account of difficulties that might be caused to the nursing staff. But several nurses from different hospitals agreed that there was no reason from the nurses' point of view why visiting should not be allowed daily in any ward. At one London teaching hospital visitors are allowed for half an hour in the evening of all days other than ordinary visiting days. If it is possible there, it is possible anywhere.

I hope that at hospitals where daily visiting is not yet allowed this matter will be considered at the next meeting of the management committees, and that the members of these committees will bear in mind that, as Mr. Parry points out, hospitals were founded not for the benefit of doctors, nurses, or committees of management, but to help restore the patients to health.

PHYSICIAN.

HEPATIC SYNDROME OF WIDE DISTRIBUTION

SIR,—I was much interested by the article of Maegraith, Andrews, and Gall (Nov. 29) on hepatic damage in malaria and a variety of other conditions. It is doubtless known to the writers, although they do not mention this, that similar pathological changes can occur in the liver after sulphonamide therapy, and that in some of these cases there is also renal damage.

In 1941 I had under my care an Indian sepoy who developed a fulminating hæmolytic anæmia, necrosis of the liver, and severe renal damage following the administration of 12 g. of sulphanilamide. When I published this case,[1] it was suggested that anoxæmia was a possible factor in causing liver damage; I was particularly impressed by this suggestion after being shown by Dr. A. Rosin, of Jerusalem, histological preparations of the liver in which she had produced practically identical changes by exposing experimental animals to lowered barometric pressure.[2] Similar observations had been made previously by Campbell.[3] From this evidence I adduced that the liver damage in my case might well be due to an anæmic anoxia, resulting from the severe hæmolysis which had taken place.

Shortly after this I saw two fatal burns cases in which liberal local application of sulphanilamide powder had resulted in blood concentrations of the drug exceeding 50 mg. per 100 ml. Autopsy in both cases revealed a similar type of liver and renal damage. The absence of any hæmolytic anæmia in these two cases led one to believe that the hepatic and renal damage in the previous case had been chiefly due to the toxic effects of the drug, and that the anoxæmic element had been over-estimated. I was not at that time aware of the published work on reflex vascular changes in the liver (referred to by Maegraith and his collaborators), which would seem to bring the liver damage in all three of these cases into much the same category. A similar mechanism for the renal damage is supported by the work of Trueta et al.,[4] who refer to renal changes, similar to those of the crush syndrome, in a wide variety of clinical conditions.

Radlett, Herts. REGINALD S. MURLEY.

WHAT IS NURSING?

SIR,—The report of the Ministry of Health's Working Party on the Recruitment and Training of Nurses contains some indications of wisdom, especially in the emphasis on "health work" and its adoption into the basic training. There is, however, one sentence which invites comment. The report says that the present system of training "is rooted in a tradition which knew little of preventive medicine or positive science for maintaining the health of the community."

Miss Nightingale has every right to be positively revolving in her grave. In her original *Notes on Nursing* there is repeated and insistent—almost virulent—emphasis on cleanliness, fresh air, orderliness, and good food. There is not a single mention of any sort of apparatus or specialist procedure. This is in marked contrast with all the recent books on nursing, most of which appear to be a cross between an instrument-maker's catalogue and a doctrinaire edition of *Clinical Methods*. It is possible that nursing of recent years may have sold some of its birthright for a mess of technical procedures. But its roots were originally sound. Among the many sentences from *Notes on Nursing* that would illustrate our point we will quote only one (though a weighty one):

> "The thing that strikes the experienced observer most forcibly is this, that the symptoms or the suffering generally considered to be inevitable and incident to disease are very often not symptoms of the disease at all, but of something quite different—of the want of fresh air, or of light, or of warmth, or of quiet, or of cleanliness, or of punctuality

1. Murley, R. S. *J.R. Army med. Cps*, 1943, **80**, 4.
2. Rosin, A. *Acta Davosiana*, 1937, **5**, 16.
3. Campbell, J. A. *J. Physiol.* 1927, **62**, 211; *Brit. J. exp. Path.* 1927, **8**, 351.
4. Trueta, J., et al. Studies of the Renal Circulation, Oxford, 1947.

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and care in the administration of diet, of each or of all of these."

In fact the nursing profession is rooted in a tradition with which it has not yet caught up. Let us hope that by 1950 people may begin to take a little notice of what Florence Nightingale said in 1860.

General Hospital, Kuala Lumpur, Malaya. CICELY D. WILLIAMS
K. M. CLARK.

THE PLEBISCITE

SIR,—Attitudes to the forthcoming plebiscite of the profession are becoming confused by divided loyalties and by appeals which are suggestive of a "closed shop" outlook. It is advisable that we should be clear about the purpose of our votes.

The Minister of Health is accused of cunningly dividing the doctors. On the one hand are the general practitioners, the great majority of whom are opposed to a scheme which they regard as the forerunner of a whole-time salaried State medical service, introduced by an unsatisfactory Act, which the Minister has uncompromisingly refused to clarify or amend. The whole freedom of the general practitioner and his peculiarly personal relationship to his patients is threatened. On the other hand, so it is said, are the consultants and specialists, the nature of whose work is unlikely to be affected to the same extent by the Act and who have come to regard the State ownership of hospitals as a practical necessity. Many of them see considerable advantage to the community in a widened hospital and specialist service, with little alteration in their relationship to their patients.

It is being suggested that all branches of the profession should return a negative vote in the plebiscite in order to support those general practitioners who are opposed to the National Health Service. This is the point at which the issue becomes confused and at which anyone who works in a hospital has to ask himself whether his vote should be governed by his own particular attitude or by that of his fellows in general practice, as expressed by the B.M.A.

Since objection is made to details rather than to aims of the National Health Service there should clearly be no sense of disloyalty to the general practitioners if the majority of hospital workers or any other groups are willing to accept the scheme so far only as it concerns their own work. Portions of the scheme can be introduced only as they meet with the agreement of those who are to carry them out, and it may well be that the hospital part of the service will be the first to start. This would in no way prejudice the possibility of suitably amended legislation before the launching of the general practitioner service.

Amongst both specialists and general practitioners there are doubtless those who either approve or disapprove of the scheme as a whole, not only as it affects their own work but as it affects the rest of the profession as well. For them the plebiscite presents no difficulties.

Some consultants and specialists with divided views may feel that their only honest course is to abstain altogether from voting, and the fact that the terms of their employment are unlikely to be published for several months might reasonably confirm them in this attitude. Others may feel themselves called on nevertheless to give an indication of probable personal intentions. The senior man, well established in either consulting or general practice, is to a large extent able to snap his fingers at the scheme, if he wishes, and vote against it without qualms.

One important group of the profession, however, should be remembered. This is the considerable body of ex-Servicemen in their thirties who are training or have trained as specialists and who rely either on hospital salaries or ex-Service grants to support themselves and in many cases their families. These men have been encouraged to continue their specialist apprenticeship on a whole-time basis in the belief that there would be a need for fully trained specialists in the National Health Service. If from a misguided sense of loyalty such men were to refuse to enter the service, they would be completely deprived of a livelihood, since (unlike the senior consultants and general practitioners) they have no private practice. If a negative vote in the plebiscite implies a refusal to sign a Government contract when the time comes, then all hospital workers who so vote will be in honour bound to relinquish their hospital appointments—a procedure which, in the case of the junior or trainee specialists, is tantamount to penury.

Specialists in hospitals appreciate the difficulties of their general practitioner colleagues but it seems hardly logical that they should be expected to vote "No" because they may disapprove of the general-practice part of the scheme, any more than the G.P. should be called upon to vote "Yes" because he may approve of the hospital part of the scheme.

The main purpose of the plebiscite should be to discover whether or not the voter is prepared to enter into a contract to work in the National Health Service in his or her particular branch of the profession on the lines now proposed. It will achieve no useful purpose if it becomes merely a manifestation of sympathy or agreement with some other branch—though this may well be a subsidiary part of the ballot.

One part of the service may become acceptable before another, but all parts must be developed and moulded by the profession in the light of its principles. A division of vote at this stage implies no division of aim.

London, W.1. ERIC C. O. JEWESBURY.

ANKYLOSING SPONDYLITIS

SIR,—The article last week by Dr. Lennon and Dr. Chalmers raises several interesting points. One, perhaps insufficiently stressed in current textbooks, is the aggravation of symptoms that is caused by immobility in most cases of ankylosing spondylitis.

Lennon and Chalmers say that the pain tends to be worse at night, the patient often rising and walking about to gain relief. I have noted this repeatedly; some four-fifths of all patients I have seen with this condition state that the early morning, after rising stiff from bed, is their worst time of day, and that the stiffness and pain which comes on in sleep takes some hours to "work off." One patient set his alarm-clock to wake him every two hours so that he might exercise himself at regular intervals through the night. Nobody had advised him to adopt this procedure; it was the only way, he said, that he could rise in the morning fit for his day's work.

The same seems to apply to thoracic-cage mobility. A young Scot with this disease found that when he restarted constant practice on the bagpipes the thoracic stiffness which was one of his main symptoms was greatly improved; that is, repeated full inspiration and prolonged expiration against pressure increased his exercise capacity and reduced symptoms referable to thoracic ankylosis. This again was entirely his own idea; no medical man had suggested to him this particular form of therapy. Patients with disease of some years' standing have frequently told me that the most unpleasant episodes in their past treatment were those when strict rest was enforced.

As regards treatment of the kyphosis, is there any evidence that the end-result in patients treated by the methods advocated by Lennon and Chalmers is any better than in those not treated by any postural methods? This may sound dangerously like heresy, but I have seen many cases which had never been correctly diagnosed and had therefore never received "correct" therapy and in which the spinal position was nevertheless perfect after the disease had run its course. This, I grant, proves nothing; but is there any proof the other way?

Finally, as regards ætiology and nomenclature; since the true cause of both rheumatoid arthritis and ankylosing spondylitis is unknown, is there anything to be gained by bracketing together two conditions, so distinct clinically and radiologically and responding so differently to therapy, under the title "rheumatoid"? The spread of the disease, the sex incidence and the joint involvement differ so widely in the two diseases that, until an ætiological agent is found, it would seem best to keep apart an illness which in nineteen cases out of twenty is clinically and radiologically distinct from rheumatoid arthritis.

F. DUDLEY HART.
Westminster Hospital, London, S.W.1.

Major-General R. J. Blackham has been re-elected a member of the court of common council of the corporation of London for the 23rd year. Dr. Arthur Westerman, medical officer of the Charterhouse, has also been re-elected.

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Medicine and the Law

After Six Years' Litigation

BEFORE rising for the Christmas recess the Privy Council disposed of an appeal from New South Wales, arising out of an action against a surgeon for damages, which Lord Simon described as "remarkable." It had been the subject of four trials before juries and a series of appeals.

Mrs. H., being troubled by the condition of her throat, on the advice of Dr. O'H. consulted Mr. B., an eminent surgeon in Sydney, who performed a thyroidectomy on March 15, 1938. A drainage tube was inserted, and according to the hospital record was removed on March 17, though the patient's recollection was that it was some days later. The conditions of its removal led her to bring an action for damages against the surgeon. The plaintiff alleged that after several efforts he removed only a portion of the tube and negligently left the remainder in the wound, which became heavily infected. After many purulent discharges it ultimately closed at the end of June. The plaintiff's case was that the foreign body, enclosed in a suppurating cavity, brought about violent and painful attacks of tetany. She continued in a bad state of health and was particularly ill on Oct. 2, 1939, after swallowing something. She felt a pain in her stomach, which she relieved by taking purgatives. On Oct. 5, having used a commode, she left her bed to empty it and saw in the pan an object which she thought was a grey piece of rubber having within it a swab with a piece of wire attached. She took it out but while pulling the chain accidentally dropped it so that it was flushed away. On her husband's return from work she narrated the incident and made a sketch of the object which was shown afterwards to Dr. O'H. From that time her recovery to normal health proceeded satisfactorily.

The plaintiff's case was that the piece of tube remaining on the right side of the neck came out through the left tonsil and, having been swallowed, passed through bowel action. There was a conflict of evidence between the witnesses for the plaintiff and those for the defence on nearly all the material circumstances—namely, the circumstances of the removal of the tube by the defendant on March 17, 1938; the condition of the plaintiff's health from 1938 to October, 1939; the condition of the plaintiff's left tonsil after Oct. 2, 1939; and the possibility of the objects described by the plaintiff travelling from the thyroid gland to the tonsil. In a word the defendant's case was that the whole thing was impossible. The later manifestations, in the opinion of the experts giving evidence for Mr. B., established that Mrs H. was suffering from hysteria.

The action was heard before a jury and judgment given for £500 damages. The defendant appealed, and the Full Court of New South Wales held that there was such a preponderance of evidence against the plaintiff's story that in returning a verdict for her the jury could not have performed judicially the task allotted to it. A new trial was ordered and the jury failed to agree. A third trial had the same result. The defendant then moved for a verdict upon the grounds that the evidence in totality was insufficient in law to be submitted to another jury and that in any case a verdict in the plaintiff's favour would be quashed as in the previous appeal. This raised a question of law—namely, whether the Full Court had jurisdiction to enter a verdict contrary to a decision reached by a jury. As the Full Court were not prepared to take that step, the action proceeded for the fourth time. At the end of 36 days' trial the jury not only found a verdict for the plaintiff but increased the damages to £800. The Full Court adhered to their previous decision, but on this occasion by a majority entered a verdict for the defendant. The next appeal lay to the High Court of the Commonwealth of Australia, where again there was a majority decision in support of the contention that the Full Court could set aside the decision of the jury. Upon this Mrs. H. was granted leave to appeal to the Privy Council *in forma pauperis*.

Lord Simon, announcing the recommendations of the Privy Council to His Majesty, emphasised "that it was no part of their duty to express or even to form their own opinion on the facts in controversy." They had to determine a specific point based upon the New South Wales Supreme Court Procedure Act, 1900, s. 7, whether the Full Court could properly order a verdict to be entered for the defendant. Their lordships found, in agreement with the minority in the Commonwealth High Court, Chief Justice Latham and Mr. Justice Dixon, that there was evidence upon which the jury were entitled to find a verdict for the plaintiff. They were unable to agree with the view that no reasonable jury could have arrived at the verdict reached in the case. Accordingly the judgment of the Commonwealth High Court was reversed and the verdict of the jury giving the plaintiff £800 with costs stands after six years of litigation.

These protracted proceedings, it will be noted, have shed no fresh light upon the professional responsibilities of surgeons but have been finally determined upon a routine matter of procedure as embodied in statute law and upon the issue, so often dominant in the hearing of appeals, whether the view of a jury has any justification upon the facts or whether it is so perverse that it cannot possibly be allowed to stand. Had a similar appeal been determined by the House of Lords, the several judgments might have yielded instructive dicta; but, since the members of the Judicial Committee must necessarily submit unanimous advice to His Majesty, the resulting document tends to be colourless. We can all form our own conclusions upon the probability of the events which it covers.

Leukæmia and War Service

Brigadier Albert Gellibrand died in Egypt in 1942 from chronic lymphatic leukæmia. His widow's application for a war pension was refused by a pensions tribunal which was not satisfied that the disability was attributable to war service. These war pension grants are statutory; the tribunal is bound by the terms of the statute. Last November Mr. Justice Denning allowed the widow's appeal against the refusal, and sent the case to a pensions appeal tribunal. In giving this decision, he remarked: "She has waited for justice long enough." Although these words can hardly have been intended to convey that, in the judge's opinion, the tribunal had acted unjustly, they have had their effect. The Ministry of Pensions has notified the widow that she has been awarded a pension and that she will not need to proceed further with her appeal. The concession, it is understood, has been sanctioned by special authority in the special circumstances of the case.

Not long ago a series of decisions by Mr. Justice Denning in respect of war pensions claims was summarised in this column (on Nov. 29). They showed the care with which the tribunals and the judge, accepting the guidance of medical science, have applied themselves in each instance to the question whether the disability was one which could be attributed to war service. In one recent decision the judge classified certain diseases (arteriosclerosis, for example) as those which have not yet been found thus attributable. Naturally precedents tend to be created. When once a particular disability has been held capable of being attributed to war service, subsequent claims based upon that disability have been the more easily established. Is leukæmia to be deemed henceforth to be taken out of the classification of non-attributable diseases? If so, upon what medical evidence?

". . . Far too little is known about the value of different incentives, and about the motives which weigh with people in selecting jobs. Much more research and experiment is most urgently needed. It is almost certain that the same incentives will not succeed in agriculture as might apply in factory industries. May not the answer to the agricultural problem be the incentive of land holdings for farm workers? In times of food scarcity, would it not be both economically and socially valuable to devise a scheme whereby workers could be attracted to farming by the promise of a personal stake in the land? This would, of course, have to be more than a simple small-holdings scheme, since it must apply to wage earners on large farms."—*Planning* (P.E.P.), Jan. 2 (no. 276), p. 205.

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Public Health

The Third Quarter

Two new low records in vital statistics were set up in England and Wales in the September quarter of 1947—both the stillbirth and infant-mortality rates were the lowest ever recorded.

The Registrar-General reports[1] that during that quarter 216,310 live births were registered in England and Wales—3529 more than in the corresponding quarter of 1946. It was the highest number recorded in any third quarter since 1920 but 18,727 fewer than in the second quarter of 1947. The birth-rate of 20·0 per 1000 total population compared with 19·7 for the September quarter of 1946, and an average of 15·7 for the third quarters of the five years 1941–45. Illegitimate births were 11,431, or 5·3% of the total births, compared with 13,324, or 6·3%, in the same period of 1946. There were 5024 stillbirths, representing 22·7 per 1000 of the total live and still births. This rate is the lowest yet recorded in this country in any quarter. Compared with the corresponding quarter of 1937, it shows a decrease of 38%.

Deaths registered in the quarter were 97,066, giving a death-rate of 9·0 per 1000, compared with 9·3 for the corresponding quarter of 1946. Deaths of children under one year of age numbered 7129. The provisional infant-mortality rate of 32 per 1000 related live births was the lowest ever recorded for any quarter in this country.

The natural increase of population was 119,244, the corresponding increases in the same quarters of 1944, 1945, and 1946 being respectively 76,340, 70,650, and 112,655.

There were 119,015 marriages. This was 21,111 more than the average for the September quarters of the preceding five years.

The analysis of the sample inquiry into the prevalence of sickness (carried out by the Social Survey for the Registrar-General) is continued in the new return with figures relating to the months of April, May, and June. In May, out of 2553 men interviewed, 1509 were reported to have suffered some illness or injury and had 927 consultations with doctors; out of 3176 women interviewed, 2200 reported illness or injury and had 1316 consultations with doctors. Taking the three months together, illness or injury of some kind during a month was reported by 64·0% of all persons interviewed; there was an average loss of 0·84 day a month for each person interviewed. Among housewives illness or injury was reported by 71·7%, compared with a general average of 63·9%.

The civilian population at June 30, 1947, is returned at 42,006,000, of which 19,707,000 are males and 22,299,000 females. The total population (i.e., inclusive of the Armed Forces and Merchant Service at home and abroad) is given as 43,270,000, of which 20,917,000 are males and 22,353,000 are females; and of these, 6,241,000 males and 6,283,000 females are between the ages of 15 and 35.

1. Registrar-General's Quarterly Return of Births, Deaths, and Marriages for the September Quarter, 1947. H.M. Stationery Office. 6*d*.

Notifications of Infectious Diseases

ENGLAND AND WALES

Disease	Week ended Dec. 6	13	20	27
Cerebrospinal fever	46	64	33	26
Diphtheria	205	233	209	157
Dysentery	93	106	83	53
Encephalitis lethargica	...	1	...	...
Measles	2799	3379	3209	2583
Ophthalmia neonatorum	45	58	53	30
Paratyphoid fever	8	3	6	22
Pneumonia, primary or influenzal	530	723	841	690
Polioencephalitis	6	7	5	4
Poliomyelitis	70	77	55	44
Puerperal pyrexia	112	116	135	68
Scarlet fever	2027	1939	2063	1469
Smallpox	..	..	..	..
Typhoid fever	..	10	4	2
Whooping-cough	1488	1737	1699	1141

Obituary

EDGAR MONTAGU PILCHER

C.B., C.B.E., D.S.O., M.B. CAMB., F.R.C.S.

Major-General Pilcher, consulting surgeon to the British Army from 1920 to 1924, died at his home at Ashstead, on Dec. 26, at the age of 82. The son of Colonel J. G. Pilcher, I.M.S., he was born in Meerut, and educated at Clifton College, Clare College, Cambridge, and Guy's Hospital. In 1892 he took his medical degree, and early in 1902 he received his commission in the R.A.M.C. and was posted to India. He served in the Tirah campaign of 1897–98, and during the South African war he was present at the relief of Ladysmith. Twice mentioned in despatches for his services, he was awarded the D.S.O. in 1900. In 1905 he took the F.R.C.S., and from 1910 to 1919 he held the chair of military surgery at the R.A.M. College. For the last two years of this period he also served as consulting surgeon to the British Expeditionary Force in France, and for his services he was appointed C.B. in 1918 and C.B.E. in 1919. He retired in 1924 with the rank of major-general.

"General Pilcher's sense of duty," writes R. S. H., "was well shown in the cholera epidemic in 1894 at Lucknow, where he lived in camp with the East Lancashire Regiment. He spared no effort in attending his patients, and the regiment made him an honorary member of their mess for life. Many honours and distinctions came his way, but E. M. was quite unspoiled. Fond of music and well read, he was full of interest in life, and his kindly help will be missed by many."

In 1899 General Pilcher married Lilias, daughter of Captain Henri Campbell, I.S.C., and after her death in 1940 he married Brenda Georgiana, younger daughter of the late Mr. A. F. Warr, M.P.

Appointments

DODD, R. R., M.B. Durh.: asst. tuberculosis officer and medical director, mass-radiography unit, Northumberland.

St. Mary's Hospital, London:
BATE, J. G., M.B. Edin.: ex-Service specialist pathologist.
CHEATLE, C. A., M.R.C.S., D.A.: ex-Service specialist anæsthetist.

West Middlesex County Hospital:
DORAN, D. M., M.A., B.M. Oxfd: director, department of physical medicine.
JENNER, F. J. V., M.R.C.P.: dermatologist.

Lancashire County Council:
Asst. county M.O.'s:
FARQUHAR, R. W., B.SC., M.B. Aberd., D.P.H.
RHYDWEN, RANYL, D.S.C., M.B. Lond., D.P.H.

Births, Marriages, and Deaths

BIRTHS

ASHWIN.—On Dec. 29, at York, the wife of Dr. R. F. Ashwin—a daughter.
CHARLTON.—On Dec. 27, in London, the wife of Mr. W. Scott Charlton, F.R.C.S.—a daughter.
DAWE.—On Dec. 27, in London, the wife of Dr. Ernest B. Dawe—a son.
DAWSON.—On Dec. 24, at Birmingham, the wife of Lieut. S. P. Dawson, R.A.M.C.—a son.
HOPPER.—On Dec. 29, the wife of Dr. Peter Hopper—a son.
JOLLES.—On Dec. 24, at Northampton, the wife of Dr. Benjamin Jolles—a daughter.
MOIR.—On Dec. 24, at Minehead, the wife of Dr. K. Tole Moir—a son.
SCOTT.—On Dec. 23, the wife of Dr. M. Gilbert Scott—a son.
SUTTON.—On Dec. 28, at Sidcup, Kent, the wife of Dr. Philip H. Sutton—a son.

MARRIAGES

GRACE—COPE.—On Jan. 3, in London, Michael Anthony Grace to Philippa Agnes Lois, only daughter of Mr. V. Zachary Cope, F.R.C.S.

DEATHS

COURTAULD.—On Dec. 26, at Greenstead Green, Essex, Elizabeth Courtauld, M.D. Brux.
DAY.—On Dec. 31, Frank Herbert Day, M.B. Durh., M.B. Lpool.
HEDLEY.—On Jan. 3, Edward Williams Hedley, M.B.R., M.D. Camb., aged 74.
PARSONS.—On Dec. 18, at Bristol, Henry F. Parsons, M.R.C.S.
SCAIFE.—On Dec. 30, at Bickington, Cecil Scaife, M.D. Dubl., D.P.H., lieut.-colonel, R.A.M.C. retd.
SIEGHAM.—On Dec. 22, at Basle, Switzerland, Frederick Siegham (formerly Siegheim), M.D. Genoa, M.D. Heidelberg, aged 56.
WOODWARD.—On Jan. 2, Henry Marton Mogridge Woodward, M.A. Oxfd, M.R.C.S.

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Notes and News

EARLY DAYS OF NURSING AT ST. THOMAS'S

THE age of St. Thomas's Hospital seems to depend on the date the historian cares to assign to its birth. Mr. Charles Graves, in a recent book,[1] dates it from 1106, when the Priory of St. Mary, beside the bridge of Southwark, gave help to sick and needy travellers; but not all Barts men will find this argument cogent. The book, though finely illustrated, is disappointing, on the whole, having the air of being rapidly assembled without much selection of material. Mr. Graves, unlike his brother, is not at home in the past, and does better when describing recent war-time catastrophes at the hospital. His chapters on Florence Nightingale, however, opportunely recall the spirit in which modern nursing was created. Her course for probationer nurses, which he quotes, can be set out in a few lines:

They were expected to become skilful in dressing blisters, burns, sores, and wounds, and in applying fomentations, poultices, and minor dressings; in the application of leeches, the giving of enemas, the management of trusses and appliances for uterine complaints; in the "best method of friction to the body and extremities"; in the management of helpless patients, including the prevention and dressing of bedsores; in bandaging, and the making of bandages, and in lining splints; and in bedmaking. They were to attend operations; to be competent to make gruel, arrowroot, egg-flip, puddings, and drinks for the sick; to understand ventilation; to be strictly careful about the cleanliness of all utensils, whether used for food or for secretions; to observe the sick carefully, taking note of the state of secretions, expectoration, pulse, skin, appetite, intelligence (delirium or stupor), breathing, sleep, state of wounds, eruptions, formation of matter, effect of diet or stimulants, and of medicines; and to learn the management of convalescents.

Leeches and massage apart, surely these are still the fundamental nursing techniques? Florence Nightingale considered that a hospital nurse could be completely trained on these lines in a year; and no-one complained of the type of nurses she turned out.

PARALYSIS AGITANS

SOME weeks ago a report appeared in lay newspapers about a German doctor who was supposed to have discovered a new and effective treatment for Parkinson's disease. Suggestions were made that the doctor should come to this country to undertake the treatment of selected cases. We understand from the Ministry of Health that the claims are without foundation.

TO MAKE THE SHOE FIT

THE Foot Health Educational Bureau has issued a booklet entitled "The Foot and the Shoe," by Mr. T. T. Stamm, F.R.C.S., which explains in simple language the basic points in the structure and function of the foot and their relation to properly made and defective footwear. Doctors and shoemakers can both learn something from its pages, and it should be useful to medical auxiliaries and all those concerned with the selection and fitting of shoes. The booklet, price 1s., may be had from the bureau at 90, Ebury Street, London, S.W.1.

FIRST-AID AT THE FACTORY

A SHORT book by Dr. Trevethick[2] brings at least three puffs of fresh air into the first-aid classroom. The first indicates that common sense is the most valuable asset of the first-aider: "a slavish routine learned from a book," he writes, "is often more dangerous than no knowledge at all." Many first-aiders believe that they will fail in their examinations if they do not know the book by heart, and unfortunately some examiners encourage this belief. The second puff, which Sir Reginald Watson-Jones in his foreword turns into a blast, deals with the tourniquet "as the most dangerous appliance" used in first-aid. Sir Reginald would go even farther than Dr. Trevethick and deny the first-aid worker the possibility of using a tourniquet: "more lives," he says, "have been lost than have been saved by the use of the tourniquet." Thirdly, Dr. Trevethick deprecates the use of antiseptics by first-aiders and thinks that they should apply only dry sterile dressings to wounds. Factory occupiers are obliged by law to keep first-aid boxes stocked with dry sterile dressings of various sizes in sealed cartons, but most first-aiders use colourful antiseptics and pieces of lint cut from a large roll.

The book can be recommended for its sensible opinions which are stated mostly in the form of lecture notes. We hope, however, that in the next edition Dr. Trevethick will eliminate the ambiguity of language which comes from over-compression and will give the book a more industrial flavour by dealing with the various types of accident which occur in a large steel-works, together with the appropriate rescue and first-aid measures.

1. The Story of St. Thomas's. London: Distributed by Faber & Faber for St. Thomas's Hospital. 1947. Pp. 72. 8s. 6d.
2. Advanced Industrial First Aid, 1947. By R. A. TREVETHICK, M.B., medical officer, Steel, Peech, & Tozer, Sheffield. With a foreword by Sir Reginald Watson-Jones, F.R.C.S. Rotherham: Henry Garnett. 1947. Pp. 63.

OUR PRISONS IN 1946

COMING hard on the heels of the 1945 report,[1] the report[2] for 1946 of the Prison Directors and Commissioners develops and expands the information given there. The steep rise of daily average population in prisons has continued, moving steadily upward from 12,915 in 1944 to 17,300 in July, 1947—a figure not equalled since 1913. Up to 1945, however, receptions had been fewer, and the explanation lies in the lower proportion of men now received with short sentences. Short sentences give little opportunity for reforming a prisoner, and seem to do little to deter the habitual offender. Sentences of imprisonment for non-indictable offences have decreased. The commissioners deplore the fact that courts thought it necessary to sentence no less than 1277 youths under 21 to imprisonment for their first proved offence; and they also feel that among over 1100 young men with more than two previous convictions who were sent to prison a substantial number would have been suitable for borstal training.

Difficulties of accommodation and staffing are still hindering training schemes for prisoners, but much has been done against odds, and the report foreshadows changes of great promise in the coming years.

SUPPLIES OF *p*-AMINOSALICYLIC ACID

FOR local application in tuberculous conditions, such as empyema, Herts Pharmaceuticals Ltd., of Welwyn Garden City, Herts, can now supply *p*-aminosalicylic acid for clinical trial. It is packed in ampoules containing 10 ml. of a 20% solution of the sodium salt.

DANGEROUS DRUGS

BY an Order in Council, entitled the Dangerous Drugs Act (Application) Order, 1947, the following drugs were, from Jan. 1, brought under the control of the Dangerous Drugs Acts and Regulations:

'Amidone' (*dl*-2-dimethylamino-4: 4-diphenylheptane-5-one), its salts, and any substance containing it.

Methyldohydromorphinone (commonly known as 'Metopon'), its salts, and any substance containing it.

University of Cambridge

On Dec. 13 the following degrees were conferred:

M.D.—J. H. Walters, T. C. N. Gibbens, V. H. Wilson.

University of London

The title of professor of bacteriology has been conferred on Lord Stamp in respect of his post at the Postgraduate Medical School of London.

Lord Stamp, who is 39, was educated at the Leys School and Caius College, Cambridge. He qualified from St. Bartholomew's Hospital in 1931, taking his M.B. Camb. seven years later. From 1932 he was demonstrator and later lecturer in bacteriology at the London School of Hygiene till he was appointed to his present post in 1937. From 1939 to 1941 he was bacteriologist in charge of the Emergency Public Health Laboratory for sector 9 of the Emergency Medical Service. His published work includes papers on the bacteriostatic action of sulphanilamide and on the agglutinogens of coliform bacilli.

The title of professor of biology has been conferred on Mr. J. H. Woodger, D.SC., in respect of the post he holds at Middlesex Hospital medical school. Mr. G. E. H. Foxon, lecturer in zoology and comparative anatomy at University College, Cardiff, has been appointed to the readership in biology at Guy's Hospital medical school.

Ministry of Health

Miss Elizabeth Cockayne, matron at the Royal Free Hospital, London, has been appointed chief nursing officer designate.

1. See *Lancet*, 1947, ii, 219.
2. H.M. Stationery Office. 1947. Pp. 130. 2s. 6d.

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University of Bristol

At recent examinations the following were successful:

M.D.—D. N. Walder.
M.B., Ch.B.—Margaret J. Andrews, D. H. Bowden, D. McL. Cunningham, Eudora M. R. Davies, N. M. Gibbs, C. E. Halliday, Pamela H. L. Hamilton, Catherine M. Hoyle, Kathleen C. Iles, S. F. Iles, Jean E. Morrell, Josephine C. Mulcahy, J. P. Norris, P. W. Seargeant.
D.P.M. (part II).—L. B. Thomas.

Mr. G. L. Alexander has been appointed director of the neurosurgical unit.

Mr. Alexander, who is 45 years of age, was educated at George Watson's College, Edinburgh, and Edinburgh University, where he graduated M.B. in 1925 and B.SC. with honours two years later. After qualifying he held house-appointments at the Edinburgh Royal Infirmary, Leicester Royal Infirmary, and Paddington Green Hospital in London, and he was also assistant lecturer in pathology at Edinburgh. In 1931 he obtained the Edinburgh surgical fellowship, and two years later the English fellowship. The same year he joined Prof. Norman Dott's staff in the department of neurosurgery, and in 1936 he was appointed to the staff of the Royal Infirmary. The following year he spent in working at the University of Chicago with a Rockefeller fellowship. During the late war he served as a neurological surgeon in the E.M.S., and since 1940 he has been neurological surgeon at Bangour Hospital. Mr. Alexander has published papers on experimental diabetes insipidus and on the epileptogenic property of sulphathiazole.

Leeds Regional Hospital Board

Dr. D. A. Lowe, medical superintendent of the Falkirk and District Royal Infirmary, has been appointed assistant senior medical officer to the board.

Public Medical Service for London

Loans made by founder members of the service in 1926 are now repayable. Applications should be made to the secretary, Tavistock House (N.), Tavistock Square, W.C.1.

Conference on the Family

The British Social Hygiene Council and the Town and Country Planning Association are holding a joint conference at the Conway Hall, Red Lion Square, London, W.C.1, on Feb. 10 and 11 to discuss The Family: Whose Responsibility? The speakers will include Dr. Mary Smith and Dr. William Moodie. Further information may be had from the council, Tavistock House North, Tavistock Square, W.C.1.

Chadwick Lectures

The February to June programme of the Chadwick Trust includes the following lectures: Dr. René Sand, How Medicine Became Social (Feb. 8, 2.30 P.M., 26, Portland Place, W.1); Sir Arthur MacNalty, Advances in Preventive Medicine during the War of 1939–45 (May 13, 4 P.M., University College, Nottingham). Further particulars may be had from the secretary of the trust, 204, Abbey House, Westminster, S.W.1.

King Edward's Hospital Fund for London

The King's Fund has received £425,000 as the 1947 allocation from a trust which Lord Nuffield set up eleven years ago to help in the rehabilitation of the parts of the country specially affected by the industrial depression. The trust deed provided that any part of the fund remaining undistributed after seven years should be transferred to the King's Fund. This latest instalment brings Lord Nuffield's contributions to the fund to £1 million.

Summer School in Health Education

The Central Council for Health Education will hold a residential summer school at High Leigh, Hoddesdon, Hertfordshire, from Aug. 11 to 25 under the direction of Dr. Robert Sutherland. The lecturers will include Prof. Samson Wright, Dr. Robert Cruickshank, and Prof. J. M. Mackintosh. Further information may be had from the medical adviser and secretary of the council, Tavistock House, Tavistock Square, London, W.C.1.

American Research into Ageing

Drug manufacturers are the principal contributors to a £250,000 U.S. research programme directed to increasing the span of life. The programme, says B.U.P., is to be directed by the new Pharmaceutical-Medical Research Foundation, which has been described by Dr. Morris Fishbein, editor of the *Journal of the American Medical Association*, as a "historic development because it is the first joint action by the pharmaceutical industry and medical profession in such an organisation for basic medical research."

University College, London

Dr. E. Ashworth Underwood is to give six public lectures at the college, Gower Street, W.C.1, on Fridays at 5 P.M., beginning on Jan. 23. His subject is to be the Heritage of Medicine. On Tuesdays, March 2, 9, 16, and 23, at 5 P.M., Mr. L. E. Bayliss, PH.D., will speak on general physiology.

Ministry of Civil Aviation

Group-Captain J. Hutchieson has been seconded from the Air Ministry to the Ministry of Civil Aviation as chief medical officer. Dr. Hutchieson, who is a graduate of Belfast, joined the R.A.F. in 1936, and has been a senior medical officer on the staff of the director-general of medical services since 1938.

Services Hygiene Officers' Dinner

The Navy, Army, and Air Force hygiene group of the Society of Medical Officers of Health is holding a reunion dinner at Stewart's Quadrant Restaurant, 74, Regent Street, London, W.1, on Friday, Jan. 30, at 7.15 P.M. Application for tickets should be made to the secretary, Dr. H. D. Chalke, O.B.E., Public Health Department, 33, Lancaster Grove, N.W.3. Brigadier A. E. Richmond, who will take the chair at the dinner, will deliver his presidential address to the group at 5.30 P.M. on the same day at B.M.A. House, Tavistock Square, W.C.1. He is to speak on the Army's Health in 1947.

A memorial service for Mr. G. F. Stebbing, F.R.C.S., will be held at St. Philip's Church, Kennington, at 12 noon on Monday next, Jan. 12.

Messrs. E. and S. Livingstone, of Edinburgh, have opened a London office at 45, Lincoln's Inn Fields, W.C.2, where their publications are available for inspection.

The title of the *Journal of the Chartered Society of Physiotherapy* has been abbreviated to *Physiotherapy*.

A new journal, the *Quarterly Journal of Experimental Psychology*, is to be published for the Experimental Psychology Group by Messrs. W. Heffer & Sons Ltd., Petty Cury, Cambridge. The subscription will be 30*s.* per annum, and single parts will be on sale at 8*s.* 6*d.* Editorial inquiries should be addressed to R. C. Oldfield, M.A., Institute of Experimental Psychology, 34, Banbury Road, Oxford.

Diary of the Week

JAN. 11 TO 17

Monday, 12th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. J. H. Doggart: Slit-lamp Microscopy.
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8 P.M. Mr. W. E. Tanner: More Worthies in Medley's Picture of the Society. (Presidential address.)

Tuesday, 13th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. C. M. Fletcher: Pneumoconiosis of Coal-miners. (First Goulstonian lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Frank Law: Physiotherapy of the Eye.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. A. C. Roxburgh: Cutaneous Syphilis.
CHELSEA CLINICAL SOCIETY
7.30 P.M. (South Kensington Hotel, 47, Queens Gate Terrace, S.W.7.) Dr. N. Langdon Lloyd: Industrial Medicine.

Wednesday, 14th

ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. H. J. Seddon: Bone Growth.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. C. W. McKenny: X-ray Technique.

Thursday, 15th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. C. M. Fletcher: Pneumoconiosis of Coal-miners. (Second Goulstonian lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. V. H. Ellis: Pyogenic Affections of Hip and Knee Joints.
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portland Place, W.1
7.30 P.M. Dr. Ernest Muir: Leprosy.

Friday, 16th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. A. Rocyn Jones: Congenital Dislocation of the Hip.
FACULTY OF RADIOLOGISTS
2.30 P.M. (Royal College of Surgeons, Lincoln's Inn-fields, W.C.2.) *Diagnosis.* Dr. J. V. Sparks: Surgical Findings in Intrathoracic Disease.
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Mr. D. S. M. Barlow: Surgery of the Œsophagus.

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An account, by the discoverer, of the bacillus which causes tuberculosis in wild voles. The importance of this organism lies in its ability to provoke considerable resistance to both human and bovine types of tuberculosis; the results of preliminary immunisation experiments in guinea-pigs, cattle and man are included in this report.

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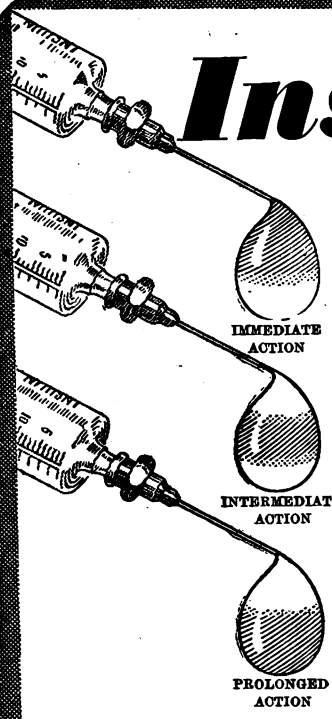

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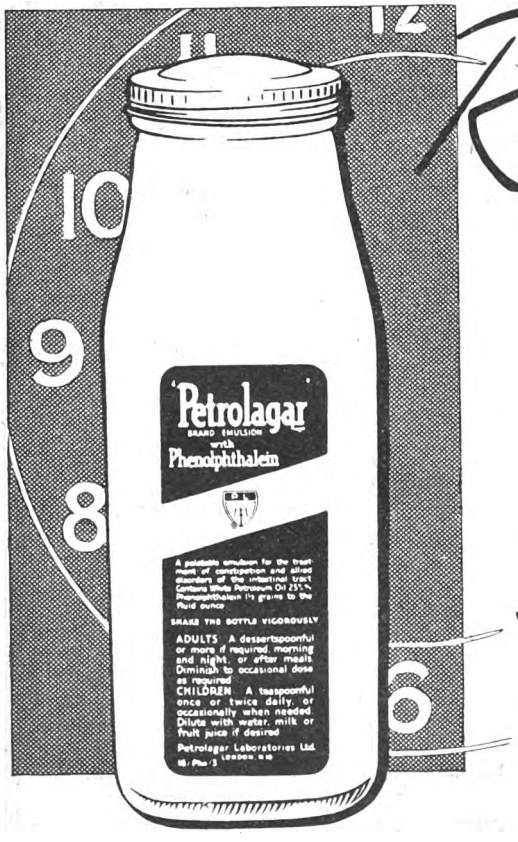
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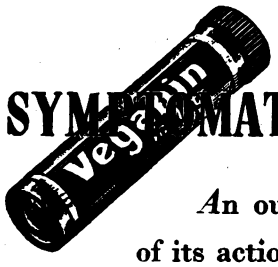

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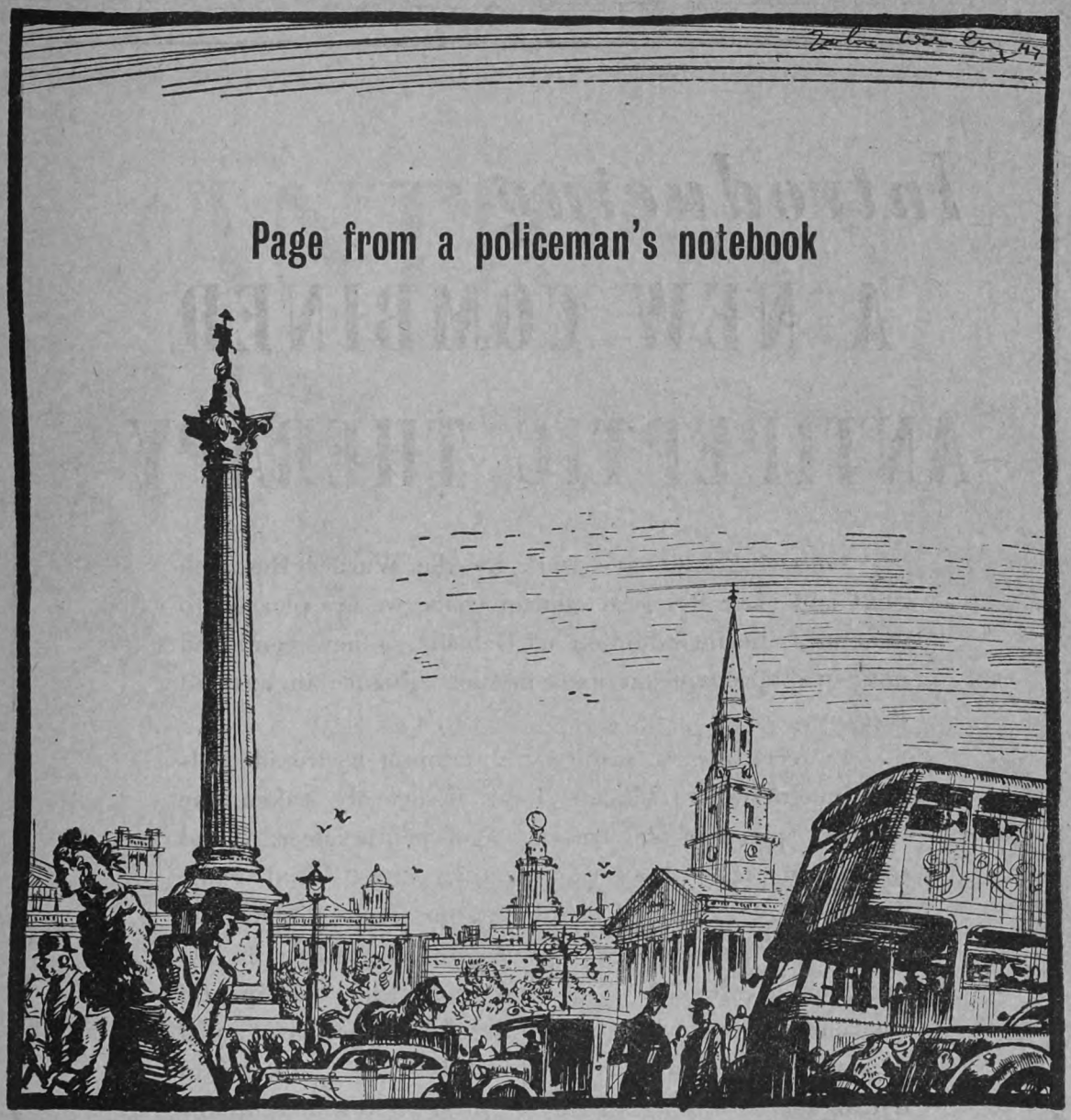

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THE PNEUMONIAS ASSOCIATED WITH EPIDEMIC RESPIRATORY INFECTIONS *

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THE word "pneumonia," without qualification, here means inflammation of the lung characterised predominantly by exudation into the alveoli, and "epidemic respiratory infections" will be taken to mean the common epidemic infections which enter by the respiratory tract, usually affect the upper respiratory tract initially, with local and constitutional symptoms, and may or may not be followed or accompanied by pneumonias of various sorts.

Epidemic respiratory infections are very many and so far poorly classified. Infections recognisable by the identification of their causal agents include influenza, infections by viruses of the psittacosis group, and epidemic hæmolytic streptococcal infections. There is circumstantial evidence that in some other cases specific viruses not yet identified may be at work; these probably comprise most of the minor outbreaks of respiratory infections. Finally there are cases in which the infection seems to be mixed, the causal agents being viruses and bacteria, sometimes more than one of each. The ætiology of the epidemic respiratory infections being so incompletely known and probably in many instances complex, knowledge of the ætiology of the lung lesions which may accompany or follow them is scanty.

Before the advent of routine radiological examination of patients with minor respiratory disorders a discussion of the pneumonias associated with epidemic respiratory infections would have been centred on discussions of influenza and of the lung changes associated with it, of clinically manifest bronchopneumonias which might be associated with acute infective catarrhs of unknown ætiology, and possibly of the rôle of the common cold and related trivial respiratory catarrhs in predisposing to pneumococcal lobar pneumonia. In all these instances the label "pneumonia" was applied only when there were clinical symptoms and signs like those characteristic of pneumonia.

When radiography of the lungs became generally used, and in a few epidemics of apparently mild respiratory infections all the patients were routinely examined, shadows were found in some cases which could only be interpreted as localised consolidations of the lung, though the patients had none of the symptoms customarily associated with acute pneumonia. About the same time, in tuberculosis clinics cases began to be detected in which transient shadows were found in the lungs of patients presenting no symptoms except those of some trivial respiratory catarrh. The earliest reports on cases of these two groups, dating from about 1930, were mainly European, especially French, Swiss, and German.

TRANSIENT RADIOGRAPHIC SHADOWS IN TRIVIAL BRONCHOPULMONARY INFECTIONS

I became interested in the transient shadows sometimes seen in the lungs in cases of trivial bronchopulmonary infections about 1937, and with Hugh Ramsay reviewed the literature and reported cases seen in the routine work of a tuberculosis clinic (Ramsay and Scadding 1939). Among 1220 new patients seen in two years we found 21 in whom relatively trivial respiratory catarrhal symptoms, occasionally with mild pleurisy or slight hæmoptysis, were accompanied by transient radiographic shadows in the lungs.

In discussing the nature of these lesions we noted that in animal experiments the introduction of viscid mucus into the bronchial tree could cause not only atelectasis † of pulmonary segments but also a transient inflammation in these segments. It had also been observed that in man iodised oil introduced into the nose during sleep could be found radiographically in the lungs next morning. It thus seemed possible for infected mucus, either of bronchial origin or trickling down into the bronchi from the nose, to obstruct bronchi or bronchioles and cause, in the lung beyond the obstruction, atelectasis and inflammation—i.e., pneumonia—whose course and severity would depend on the bacteria present. The resulting lesion can be called either infected segmental or lobular atelectasis or "aspiration pneumonia."

We concluded that the cases we had described were essentially of this nature; and that mildly infected atelectasis of lobules, segments, or lobes might arise during the course of various acute and chronic catarrhal affections of the respiratory tract. This view was adopted by Andrus (1942) and Becker (1943). The sputum in such cases usually contains only those types of bacteria which may be found in the upper respiratory tracts of healthy persons, those usually associated with pneumonia being absent or not prominent.

These cases were sporadic, and some of them were associated not with any obvious epidemic respiratory infection but with chronic catarrh of the respiratory tract; it was therefore unlikely that they could be due to infection by a specific pneumonotropic virus. I wish to emphasise this association of transient shadows, which are best interpreted as "aspiration pneumonias," with chronic catarrh of the respiratory tract, which can hardly be attributed to pneumonotropic viruses. In chest clinics they are very often seen in patients with chronic bronchitis, asthma, or chronic abnormalities of the upper respiratory tract causing excessive secretion, as well as in those with more acute and possibly infective respiratory catarrh. In several chronic bronchitic subjects I have seen more than one episode of "aspiration pneumonia," in some instances appearing successively in different parts of one or both lungs.

In cases of the sorts so far discussed the lung lesions are probably non-specific, in the sense that they consist of infected atelectases in which the pneumonia is not due to specifically pneumonotropic organisms. However, in 1937 I reported 4 cases, occurring within a short time in the same locality, in which there was a prolonged febrile illness accompanied by a peculiar type of pneumonia in scattered small foci; the constitutional symptoms at the onset were far more prominent than the respiratory symptoms (Scadding 1937a). I used the purely descriptive name "disseminated focal pneumonia" for these cases. No recognised pathogenic bacteria were associated with them, and one of them, after a rather prolonged course, was fatal from a bulbar encephalitis. At the time I expressed no opinion about the ætiology, but in retrospect it seems plausible that they were due to an unidentified specific virus strongly pneumonotropic and feebly neurotropic.

PNEUMONIAS ASSOCIATED WITH EPIDEMIC INFLUENZA

It may be helpful at this stage to recall the present state of knowledge about the pneumonias accompanying

* Adapted from a paper read at the joint meeting of the Tuberculosis Association and the Scottish Tuberculosis Society in Edinburgh in July, 1947.

† Though etymologically "atelectasis" should strictly be applied only to lack of expansion of the fœtal lung, its use to denote also acquired collapse of pulmonary lobules, segments, or lobes has become so general that no confusion should be caused by its use in this wider sense.

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influenza, which is certainly the most completely investigated virus infection of the respiratory tract.

The influenza virus of Smith et al. (1933) is responsible for some of the interpandemic outbreaks of influenza, and there is considerable indirect evidence that the causal agent of pandemic influenza is at least closely related to this virus. In mice and ferrets the influenza virus can produce pneumonias without secondary bacterial infection; but in all the reports on the 1918–19 pandemic, I have been able to find records of only 2 fatal cases of influenzal pneumonia in which bacteria could not be found either by culture or by direct microscopy (Goodpasture 1919).

Fatal human cases of "influenzal" pneumonia in general showed invasion of the lungs by independently pathogenic bacteria. In 1937 I studied the lung changes in an outbreak of proved virus influenza (Scadding 1937b). As a result of this study and of a survey of the reports concerning the 1918–19 pandemic I concluded that both the influenza virus and bacteria are concerned in the pathogenesis of the lung lesions accompanying or following influenza, and that the great variety of clinical pictures presented was due to the combined effect of variations in extent and severity of virus damage with invasion at various stages by bacteria of various types and virulence. At one end of the scale there are cases in which influenza seems to have no more specific an effect than the trivial acute upper respiratory infection which has been found to precede pneumococcal pneumonia in 40–80% of cases (Heffron 1939), and the pneumonia differs little from a bacterial pneumonia; at the other there are the fulminating "influenzal" pneumonias, fatal within a few days of onset, in which there seems to be an overwhelming virus infection with simultaneous superinfection by strongly pathogenic bacteria.

The position with regard to the pneumonias associated with influenza at times of definite epidemics thus seems fairly well established. Outbreaks of respiratory infection due to influenza viruses A and B occur every few years, and there is some indication that these recurrences may have a clear periodicity. In years in which there is no definite epidemic, minor outbreaks of respiratory infection none the less occur; and the rôle of the influenza viruses in these is rather obscure, since it has been found that in some of them evidence of infection by influenza virus A or B may be obtained in some cases by demonstration of a significant rise in antiviral antibodies, while clinically indistinguishable cases in the same outbreak show no such evidence (Stuart-Harris et al. 1943). It therefore seems that in these outbreaks the ætiology of the uncomplicated "febrile catarrh" may be complex. Hence it is not surprising that the lung changes associated with them are of diverse sorts and probably of mixed ætiology (Ziegler et al. 1947).

"PRIMARY ATYPICAL PNEUMONIA"

Since about 1939 the amount of published work on the pneumonias apparently not due to specific bacterial infections and associated with non-influenzal epidemic respiratory disease has been enormous. The difficulty of nomenclature of this group in the absence of precise ætiological information is considerable, and the official name proposed in the United States—"primary atypical pneumonia"—has gained wide acceptance.

I regard this term as unfortunate. First, it implies a specificity which is not justified, conveying the impression that the cases to which it refers are due to a common infective agent. In fact, diseases of widely differing ætiology have been described under this term. It seems almost certain that, in all outbreaks in which pneumonic lesions of this type have been described, many cases occur in which the infecting agent causes only an upper respiratory infection short of pneumonia. Secondly, the terms "primary" and "atypical" may both be criticised, the first on factual grounds, and the second on logical grounds. "Primary" presumably implies that the pneumonia is regarded as attributable to the action of agents specifically invading the lungs, and in some instances this is a reasonable hypothesis; but in many instances it can equally well be regarded as an atelectasis followed by infection by bacteria present in the respiratory tract, and not due to any specific virus or other organism, even though it may complicate an epidemic upper respiratory catarrh presumably of virus origin. The term "atypical" is logically indefensible. It presupposes that the observer has in mind some ideal norm of pneumonia which he regards as typical, and implies that the sort of pneumonia to which reference is being made is not like this norm. No-one, however, has stated what this typical pneumonia is. Is it pneumococcal pneumonia? If so, staphylococcal and influenzal pneumonias are atypical. Is it any other sort of bacterial pneumonia? If so, influenzal and other proved virus pneumonias are atypical. In fact, this term, implying knowledge of an ideal and perfect pneumonia existing as it were in some platonic heaven, is not only meaningless but confusing. I was once delighted to hear an incautious person refer to "an atypical atypical pneumonia."

TABLE I—ISOLATION OF VIRUSES FROM "ATYPICAL PNEUMONIA" IN MAN

Virus	Origin	Clinical severity
Psittacosis group:		Severe illness, with high mortality
Psittacosis Ornithosis	Parrots, finches, fulmar petrels, pigeons, domestic fowls, and probably other birds	
Louisiana pneumonitis	Unknown; possibly a wild animal	
Feline pneumonia virus	Cats	
Rickettsia: Q fever ..	Doubtful, except in two recorded laboratory outbreaks	Fairly severe illness, but probably many mild cases
Mongoose-infective (Weir and Horsfall 1940)	? Human	Not stated
Cotton-rat-infective (Eaton et al. 1942)	? Human	Mild, with low mortality

Evidence for a Virus Origin.—The assumption that the pneumonia in these cases is due to a specifically pneumonotropic virus has been based on several considerations.

(1) Many outbreaks consist of cases which run a clearly defined and recognisable course and in which the clinical picture from case to case is so uniform that it seems likely that a common infecting agent is responsible.

(2) None of the bacteria commonly associated with pneumonias is constantly present in the sputum.

(3) A few necropsies on cases in outbreaks of this sort apparently not due either to viruses of the psittacosis group or to rickettsias have been recorded (Kneeland and Smetana 1940, Longcope 1940, Dingle et al. 1943, Campbell et al. 1943, Rhoads 1943, McCarthy 1943, Meiklejohn et al. 1945, Grimm and Denton 1945). It is significant that all these cases were derived from definite outbreaks. Though the changes reported vary somewhat, certain general features can be made out.

There was a desquamating bronchitis in the larger bronchi, often with purulent exudate, while in the smaller bronchi there was a mononuclear cell exudate. The interstitial tissues were usually infiltrated with mononuclear cells, and in some instances there were changes in the smaller branches of the pulmonary artery, either necrosis and cellular infiltra-

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tion of its walls or thrombosis. In areas of consolidation the exudate was mainly mononuclear. Bacteria, if present, seemed to be concerned secondarily in the changes in the larger bronchi only.

These lesions are unlike those found in the pneumonias due to any of the commonly recognised bacterial agents.

(4) Virus pneumonias, without contamination by bacteria, are well recognised in small laboratory animals; in fact latent strains of pneumonotropic viruses for such animals have proved to be a nuisance in experimental work on the presumed pneumonotropic viruses of man, since simple passage of material from animal to animal, a method commonly used in virus studies, may activate these latent strains and enable them to cause a pneumonia.

(5) In some cases of this sort the blood shows "cold agglutination" (Peterson et al. 1943, Horstmann and Tatlock 1943, Turner 1943, Turner et al. 1943, Shone and Passmore 1943, McNeil 1945, Young 1946); this phenomenon consists of auto-agglutination of the red cells by the plasma as soon as the blood reaches room temperature, and is reversible on warming the blood again to body temperature. It has been recognised for many years as a rare anomaly in certain blood dyscrasias, in some forms of peripheral vascular disease, and occasionally in hepatic and splenic disease; it is found regularly in trypanosomiasis (Stats and Wasserman 1943). In the most extreme examples the red cells agglutinate immediately a drop of blood is placed on a slide at room temperature. Cold agglutination, usually in a less extreme form, occurs in a high proportion of cases in some outbreaks of respiratory infections with pulmonary lesions, but in other outbreaks it is observed inconstantly or not at all. In an outbreak of respiratory infections in an Indian Army unit in the Middle East, in which some cases showed pulmonary lesions, Shone and Passmore (1943), whose cases I observed, found cold agglutination not only in the cases with pulmonary lesions but also in some in which only the upper respiratory tract appeared to be affected. Thus though cold agglutination may well be related to virus infection, there is no evidence that it is specific to any one virus affecting the respiratory tract; it may appear when the infection does not involve the lung; and in some well-defined outbreaks which otherwise resemble "primary atypical pneumonia" it has been absent.

TABLE II—SOME LATENT PNEUMONOTROPIC AGENTS OF LABORATORY ANIMALS

Agent	Reference	Susceptible animals
Elementary-body group (psittacosis-like)	Mouse pneumonitis (Nigg 1942, Nigg and Eaton 1944)	Mice, hamsters
P.V.M. group ..	Pneumonia virus of mice (Horsfall and Hahn 1940)	Mice, cotton-rats, rabbits, hamsters
	Affecting Syrian hamsters (Pearson and Eaton 1940)	
	Affecting cotton-rats and rabbits (Eaton and van Herick 1944)	
Mouse-infective virus	Dochez et al. (1937)	Mice
"Grey lung" virus	Andrewes and Glover (1945)	Mice, cotton-rats, other rodents feebly
Pleuropneumonia-like organisms	Edward (1940)	Mice

Evidence against a Single Specific Virus Origin.—There are many considerations against the view that primary atypical pneumonia is due to a single specific ætiological agent.

(1) The outbreaks described under this term vary enormously in clinical picture and severity. Two small groups in which known ætiological agents have been isolated must be mentioned—psittacosis and rickettsiasis. The viruses of psittacosis, lymphogranuloma venereum, and meningopneumonitis all form elementary bodies and are antigenically related (Eaton and Corey 1942). Psittacosis may be carried by parrots, pigeons, finches, barn-yard fowls, and fulmar petrels; and a serious disease including a virus pneumonia has been transmitted to man from these birds (Bedson 1940, Eaton et al. 1941, Meyer 1942, Meiklejohn et al. 1944). There is also some evidence that cats may be infected by a virus of the psittacosis group and possibly transmit it to man (Baker 1942).

A localised outbreak of a severe pneumonia due to a virus of the psittacosis group was reported from Louisiana in 1943 (Olson and Treuting 1944, Treuting and Olson 1944, Binford and Hauser 1944, Olson and Larson 1944, Larson and Olson 1946, Fite et al. 1946). Of 17 recognised cases 8 were fatal. There was good evidence that the virus was transmitted direct from fatal cases to the patients' attendants. The virus was presumed to have an animal origin, since the first patient was a trapper, but its exact source was not determined.

The illnesses caused by viruses of the psittacosis group are invariably severe with considerable mortality, obviously differing from the general run of cases which have been described as primary atypical pneumonia, and the lung lesions associated with them should be called pneumonias of the psittacosis or ornithosis group.

The other group in which an undoubted agent has been isolated is the rickettsial, of which two small outbreaks associated with the rickettsia of "Q" fever have been reported from the United States among workers in a laboratory (Hornibrook and Nelson 1940, Dyer et al. 1940, Lillie et al. 1940, Huebner 1947) and one among workers in a cattle yard (Topping et al. 1947, Irons and Hooper 1947, Irons et al. 1947, Cox et al. 1947). There is good evidence that several of the outbreaks reported as "primary atypical pneumonia" from the Mediterranean area during the late war were due to the rickettsia of "Q" fever (Commission on Acute Respiratory Diseases 1946a, Robbins and Rustigan 1946, Feinstein et al. 1946, Caughey and Dudgeon 1947). The infection is thought to have been conveyed by inhalation of infected dust, though its source in the Mediterranean cases remains doubtful. These "Q" fever cases also present a distinguishable clinical picture and can be recognised with certainty by laboratory investigations; and the lung lesion associated with them should be called "rickettsial pneumonia."

Apart from these specific types of pneumonia, the outbreaks described as primary atypical pneumonia vary from mild epidemic upper respiratory catarrhs, in a small proportion of which transient pulmonary consolidations have been discovered radiologically, to more severe respiratory infections in which pulmonary consolidations occur in a high proportion of cases and may cause a febrile illness of several weeks' duration with some mortality. There has also been a tendency to describe any pneumonia incident whose ætiology is not precisely understood as primary atypical pneumonia. Kay (1945), for instance, has described cases of bronchiectasis arising after primary atypical pneumonia; in these it seems that the so-called primary atypical pneumonia was atelectasis followed by infection, and the phenomenon that was being described was simply the well-known association between bronchiectasis and atelectasis.

(2) Though some published radiograms show lesions of a diffuse non-segmental distribution or in small scattered foci, many of them show segmental shadows which might be interpreted as aspiration pneumonias.

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Some workers have recognised the resemblance of the radiographic appearances of their cases to those of atelectasis (Campbell et al. 1943) but lateral views seem rarely to have been taken. Dingle et al. (1943) published radiograms of 4 cases; so far as can be judged from the postero-anterior views, these show segmental lesions, 2 involving the posterolateral segment of the right upper lobe, 1 the middle lobe, and 1 the anterolateral segment and later the lingula of the left upper lobe. A diffusely mottled appearance is not conclusive evidence against an aspiration pneumonia, since it can be produced either by scattered lobular atelectasis or during the resolution of an originally segmental or lobar lesion such as a postoperative "massive collapse" due to residual foci of persistent alveolar exudation.

(3) Attempts to isolate a virus in primary atypical pneumonia, excluding psittacosis and rickettsiasis, have met with little success. In the few instances in which disease has apparently been transmitted to animals from man, the type of disease transmitted and the animal used have varied considerably, and in some the virus could not be maintained long enough for complete investigation. Work on these lines is hampered by the presence of latent respiratory-tract viruses to which many laboratory animals are susceptible, as noted above. Hence the results of many of these virus studies must be regarded as equivocal, and certainly no constant virus has been isolated.

Virus Studies.—Reimann in 1938 described 8 cases of a peculiar rather long-continued respiratory infection with lung involvement consisting of a pneumonia in scattered small foci closely resembling the cases I described in 1937 as "disseminated focal pneumonia." Mice inoculated with nasopharyngeal washings from one of these cases and with blood from another developed pneumonia and encephalitis after an incubation period of two weeks. It may be recalled that one of my patients in 1937 died several weeks after the onset of the pneumonia with evidence of bulbar encephalitis.

Stokes et al. (1939) reported the isolation of a filtrable agent from 2 patients with "acute pneumonitis," infectious for mice, guineapigs, and possibly ferrets, causing in them pneumonia and encephalitis; but the virus died out before serological tests could be done.

Weir and Horsfall (1940) attempted to transmit disease to various animals from cases in an outbreak of respiratory infection with "pneumonitis," of which they gave no further clinical details; ferrets, mice, guineapigs, rabbits, monkeys, opossums, voles, deer-mice, and Syrian hamsters were inoculated without success. With commendable persistence they took their material to Jamaica to attempt passage to mongooses. This was necessary because these animals may not be imported into the United States.

They inoculated 2 ml. of throat washings from each of 4 patients intranasally into 2 mongooses anæsthetised with ether and produced lung lesions. In 10 serial inoculations of one filtered washing, 11 of 19 inoculated animals showed lung lesions. In 25 serial passages of the 4 throat washings, 64% of 90 animals showed lung lesions, 44% with consolidation. They remarked that clinical observation of the mongoose was almost impossible. Tests for the presence of latent pneumonotropic virus in the mongoose were negative. Five mongooses were kept in contact with 5 of the inoculated animals, and 4 of them had lung lesions thirteen days after the beginning of contact. The lesions were bacteriologically sterile. Mongooses were found to be insusceptible to PR 8 influenza "A" virus or to certain strains of mouse-pneumonia virus, and were probably also insusceptible to the virus of lymphocytic choriomeningitis. Attempts to infect other animals from the mongooses failed. Convalescent sera from human cases of "acute pneumonitis" conferred some protection.

Eaton et al. (1942) transmitted a virus from cases of primary atypical pneumonia to chick embryos by inoculation with suspensions of bacteriologically sterile lung tissue or filtered sputum. This virus was further investigated (Eaton et al. 1944), and Meiklejohn et al. (1945) subsequently described the clinical features of the disease in man which they considered to be associated with it. Three strains were adapted by passage so that they would infect cotton-rats or hamsters by intranasal inoculation, causing pulmonary lesions. The agent propagated in chick embryos was neutralised by the serum of patients recovered from primary atypical pneumonia and was not neutralised by serum taken during the acute phase. However, passage of the virus in cotton-rats and hamsters gave confusing results because of the contamination with latent respiratory-tract viruses already present in these animals.

Much work has been done on this virus, which seems fairly well established as a cause of disease in man.

Breslow (1945), who studied clinically an outbreak in which there was serological evidence of infection by this virus, described the illness as generally mild, in which only a proportion of the cases show evidence of pneumonia. He remarked that "The disease is probably not primarily a pneumonia. . . . The designation 'atypical pneumonia' seems to exaggerate what is probably only an incident in the disease."

Tables I and II summarise some of these investigations and knowledge acquired thereby about the latent pneumonotropic agents in animals.

Experiments in Human Volunteers.—Vance et al. (1943) failed to infect 7 volunteers with filtered pooled sputum and nasal washings from human cases of "primary atypical pneumonia." The Commission on Acute Respiratory Diseases (1946b) reported two series of experiments on human volunteers. The first was inconclusive, lung lesions developing in subjects receiving autoclaved material as well as in those receiving filtered and untreated material; this result was attributed to insufficiently strict segregation of the subjects. In the second, 42 volunteers were inoculated with a pool of sputum and throat washings from experimentally produced cases of primary atypical pneumonia. Respiratory illness of the primary atypical pneumonia type developed in 3 out of 12 receiving untreated material. No cases occurred in 18 volunteers receiving autoclaved material. The incubation period with filtered material was twelve to fourteen days, and with unfiltered material five to seven days.

In these experiments pooled material was used; hence any virus present in any of the subjects from whom the material was derived could have caused all the infections observed in the experimental subjects; the inoculations were given by a very gross method, the subjects each inhaling nebulised material deeply for fifty breaths thrice daily for three days; and 10 cases of "undifferentiated respiratory illness" without pneumonia developed in the 24 volunteers receiving presumably active material. The results must therefore be interpreted with caution.

SUMMARY

There are probably several, perhaps many, viruses besides those now recognised, causing epidemic respiratory infections in which a varying proportion of cases may be complicated by pneumonias not due to specifically invasive bacteria.

These viruses cause illnesses of variable severity.

Some of these infections are associated with the development of cold agglutinins, and some are not.

In association with some of them lung lesions of virus origin may develop; but non-specific lesions of the infected atelectasis type may develop in any of these epidemic respiratory infections, as they may in any respiratory catarrh.

The name "primary atypical pneumonia" should be abandoned. Cases of proved ætiology—e.g., psittacosis

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and rickettsiasis—should be labelled appropriately. When the evidence suggests infection by an unidentified pneumonotropic virus, the case should be labelled "pneumonia, presumably due to an unidentified virus."

In the absence of a local epidemic of similar cases this diagnosis can rarely be justified on clinical grounds alone.

When the evidence suggests a non-specific infected atelectasis complicating an acute or chronic, infective or non-infective, respiratory catarrh, the labels "infected atelectasis" or "aspiration pneumonia" should be applied.

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TREATMENT OF ARTHRITIS BY INTRA-ARTICULAR INJECTION

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FOR patients with osteo-arthritis there seemed, until recently, to be little to offer between palliative treatment and major surgery. Many of these patients were either unsuitable for surgical measures or suffering from a condition not really serious enough to justify such major procedures. Those relegated to the department of physical medicine spent many hours of their time (and that of the masseuses) on treatment which at best achieved temporary relief only, and at worst seemed to make little difference. It was in an attempt to fill the gap that we decided to try the treatment first suggested by Grant Waugh,[1] using the solution of lactic acid which he recommended, and later to assess the value of this fluid against that of alternative solutions.

The cases were selected on a very wide basis. They were divided into: (*a*) osteo-arthritis, either "idiopathic" or of traumatic origin; and (*b*) rheumatoid arthritis (usually of the menopausal type resembling osteo-arthritis radiologically), either "burnt out" or still active—i.e., with raised erythrocyte-sedimentation rate (E.S.R.). Though cases with raised E.S.R. occasionally do not benefit, we have seen only one general "flare-up" following an injection, and, in our opinion, sufficient of these cases are benefited to justify a trial.

Of these cases 52 were treated long enough for us to assess the results. Most of them were observed for six to eighteen months. The number of injections given to each patient ranged from 2 to 22, and the average was 10. Some of these patients are still under treatment. The joints treated were as follows:

	Unilateral	*Bilateral*	*Total joints*
Hips	19	5	29
Knees	12	11	34
Shoulders	3	1	5
Thumbs (carpometacarpal)	0	1	2
		Total	70

Two kinds of joints were treated: those in which the range of movement was full, or nearly so, but in which the patient's disability was due to pain; and those in which the disability was due to limitation of movement in addition to pain. In all cases the diagnosis and the extent of the arthritis were confirmed by radiography. The radiological appearance often seems, however, to bear little relation to the clinical findings and symptoms. We have found, on the one hand, patients with gross disability in whom radiography showed very little loss of joint-space and little roughening, whereas, on the other hand, others have had relatively little disability though radiography suggested very severe osteo-arthritis.

In the early stages of treatment injections were given fortnightly. Later the frequency was usually reduced. Improvement might, after a time, continue spontaneously and the frequency of injections might then be reduced, but injections had to be continued sufficiently often to maintain progress. When maximal improvement had apparently taken place, it was often necessary to continue occasional injections to prevent regression.

GENERAL PROCEDURE

The treatment was carried out in the operating-theatre of the outpatient department. It was felt that only in a theatre could adequate asepsis be maintained. A standard lay-out for the theatre trolley was evolved (fig. 1). A diagram of this lay-out was hung in a frame

1. Waugh, W. G. *Rheumatism*, July, 1939.

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over the trolley, so that there could be no confusion over the nature of the solution in each gallipot.

Each patient occupied about a quarter of an hour, and appointments were made accordingly. The importance of this is discussed below. In a small room next to the theatre the skin area over the joint was washed by a nurse with soap and water and if necessary shaved. On entering the theatre the patient was placed on the table and was asked for any comment on his progress, or otherwise, since the last injection. Leading questions were, so far as possible, avoided. The range of movement was assessed with a protractor, and the notes being referred to *afterwards*, so as to make the measurement as objective as possible. Any changes in muscle power, crepitus, and deformity were noted.

The patient was then placed in position for injection. If a knee was to be injected, the patient sat with the table back-rest raised and the knee comfortably flexed over a straw pillow. If a hip was to be injected, the patient lay on the opposite side, with the straw pillow between his knees, the underlying knee flexed, and the upper knee extended. It is essential that the gluteal muscles be relaxed, or the upper edge of the greater trochanter may be difficult to define.

The skin was cleansed with 1% 'Cetavlon' solution; the injection area was "towelled off"; 2 ml. of 2% procaine was drawn up into the syringe; and the site of injection was palpated and marked with Bonney's blue, a sterile pen being used, and the area was swabbed again with cetavlon.

Syringes (usually 20 ml.) were sterilised by boiling, kept in 5% 'Dettol' in spirit, and rinsed in distilled water before use. Time and tempers were saved by having differently coloured cotton threads wound round the barrel and plunger of each syringe, so that each could be readily mated. A Howard-Jones lumbar-puncture needle was found most suitable for injecting the hip-joint. For all other joints a normal-sized intramuscular needle was found suitable, except occasionally in the presence of great periarticular thickening, when a longer needle was necessary. For the hip-joint an ideal combination was a Gabriel type hæmorrhoid syringe with a Howard-Jones needle adapted to it with a bayonet fitting.

In making the injection, a bleb of 2% procaine was first raised with a subcutaneous needle. The injection needle was then fitted to the syringe and was driven down to the capsule of the joint, infiltrating with procaine only if pain was felt. The syringe was then rinsed and emptied. It was reattached to the needle, which was then driven through the capsule of the joint. The plunger was retracted to exclude the presence of a joint effusion. The syringe was again disconnected, and the solution selected was drawn up into it. The injection was then given.

For joints other than the hip the presence of the point of the needle within the joint space is usually obvious. The hip presents more difficulty. The approach used was from the lateral aspect of the joint, as recommended by Waugh [1] and Mawson.[2] The following criteria suggest that injection is being successfully made:

(1) It is usually given against considerable resistance (this is at variance with Mawson's experience).

(2) The tip of the needle can sometimes be felt to be nipped between the head of the femur and the acetabulum.

(3) The patient often complains of pain going down to the knee during the injection; others feel an increasing fullness in the region of the joint.

(4) After the injection crepitus is very often abolished; this we regard as absolute proof that injection has been efficient.

The quantity of fluid used varied from joint to joint, but 10 ml. was usually adequate for hips and knees, 5 ml. for shoulders, and 1 ml. for thumbs.

Where the condition was bilateral, lactic-acid solution was injected into the joint on one side, and "pH-adjusted" procaine (or, more recently, normal saline) into the other. Though the condition of the two joints was seldom exactly comparable, the effect of the two types of solution over a fair number of cases can be broadly compared. In no case did the responses differ much between the solutions used.

2. Mawson, R. *Brit. med. J.* 1946, ii, 693.

ADVICE TO PATIENTS

For twenty-four to forty-eight hours after an injection, while the effect of the local anæsthetic is still present, the joint may be injured without the patient realising that anything has happened. This is carefully explained to each new patient, and, where possible, arrangements are made to convey him home by car. He is told to avoid weight-bearing for the forty-eight hours after each injection.

As the effect of the procaine begins to wear off, there may be a transitory pain reaction. Patients are given analgesic tablets to ease them through this disagreeable period. These reactions seem to develop particularly

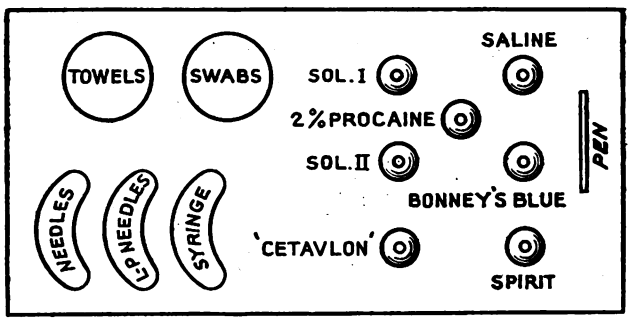

Fig. 1—Lay-out for theatre trolley.

where the range of a joint is still improving. They are due possibly to the breakdown of adhesions ("procaine effect"), or to the fact that areas of disused joint surface are again playing a part in the weight-bearing functions of the joint.

Non-weight-bearing exercises are taught to each patient. These are done twice daily, starting immediately after the injection and continuing through the period of "anæsthesia" until the next injection. It is emphasised that these exercises must become a daily routine, and that they may have to be continued for the rest of the patient's life. Some of our patients have fixed up simple static bicycle exercisers at their homes, and these have been of great value, especially in the case of arthritic hips.

Though there may clinically be no movement in a joint, it is always worth while to give two or three trial injections. In this way a few valuable degrees of painless movement may be achieved in a joint which has previously been thought to be in a state of painful fibrous "ankylosis." If, with any type of joint, no improvement is discernible after four injections, the position is reconsidered in consultation with the orthopædic surgeon.

ASSESSMENT OF RESULTS

The most important factors in assessing improvement are the increase in the range of movement and the diminution of pain in the joint. Improvement in the patient's general condition may be due to one or the other factor, or to both. When a patient is first seen he is carefully questioned about how much he can accomplish. For instance, he may be able to walk 500 yards without pain; he may be unable to do more than hobble from room to room; he may be unable to stand up from a sitting position without help; or, as a result of sleeplessness due to pain, he may suffer from loss of appetite and consequent loss of weight. The history is correlated with the physical findings, and a base-line is constructed from which any subsequent progress is assessed.

Working on this basis our results have been classified as follows:

(1) No improvement.
(2) Slight improvement, but continuing injections.
(3) Slight improvement, but injections have been discontinued because no further improvement is expected.

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(4) Moderate improvement, but continuing injections.
(5) Moderate improvement, but injections have been discontinued because no further improvement is expected.
(6) Great improvement, but continuing injections.
(7) Great improvement, but injections have been discontinued because no further improvement is expected.

Example of (2) and (3): "Used to be disturbed by pain at night but now able to sleep restfully without sedation. No obvious improvement in performance."

Example of (4) and (5): "Definite decrease of pain at rest and on movement. Improvement in performance, but way of life still very limited by the disability."

Example of (6) and (7): "Very little pain. Way of life has been completely transformed by treatment. Has returned to active work." (Four of these were "procaine effects"—i.e., they had one or two injections and became symptom-free having presumably carried out a manipulation under local anæsthesia on themselves.)

The results obtained in 52 patients treated, irrespective of type of injection fluid used, were as follows:

	No. of cases
(1) No improvement	13
(2) Slight improvement (continuing injections)	7
(3) Slight improvement (ceased injections)	4
(4) Moderate improvement (continuing injections)	7
(5) Moderate improvement (ceased injections)	5
(6) Great improvement (continuing injections)	2
(7) Great improvement (ceased injections)	14

The results of treatment of 70 joints by intra-articular injection, according to the solutions used, were as follows:

	Solution I	Solution II	Solution III
(1) No improvement	14	6	—
(2) Slight improvement (continuing injections)	5	5	—
(3) Slight improvement (ceased injections)	3	1	—
(4) Moderate improvement (continuing injections)	5	6	1
(5) Moderate improvement (ceased injections)	4	2	—
(6) Great improvement (continuing injections)	1	—	1
(7) Great improvement (ceased injections)	12	4	—

Solution I: lactic acid in 2% procaine; pH 5·4 (Brady and Martin).

Solution II: 0·5% procaine adjusted to pH of 7·6 with sodium phosphate—i.e., about normal joint pH.

Solution III: normal saline (other patients are under treatment with this but not long enough to be included in this series).

There is an apparently higher percentage of final improvement on lactic acid. This, we think, is due to the fact that we have used the lactic-acid treatment longer than the others, with the result that more of those treated with lactic acid have been followed to their end-results.

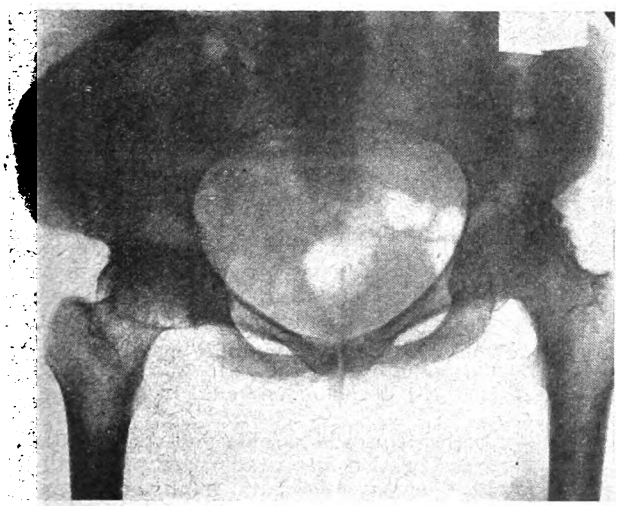

Fig. 2—Osteo-arthritis of hips, showing partial destruction of femoral heads and irregularity of acetabula, but some joint space still present (case 2).

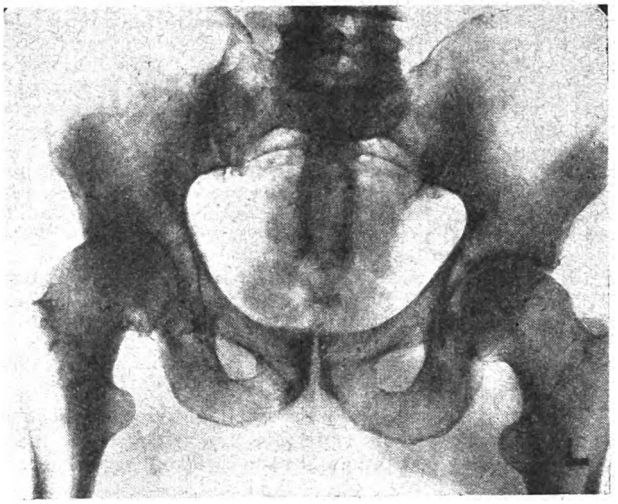

Fig. 3—Osteo-arthritis of right hip, showing osteophytes and much loss of joint space (case 3).

The causes of failure in 13 out of 54 cases were as follows:

Organic factors	No. of cases
Periarticular adhesions	1
Painful "ankylosis"	1
Paget's disease	1
Personal factors	
Neurosis	2
Compensation factor	1
Uncooperative	3
Failure to attend	3
Unknown	1
Total	13

ILLUSTRATIVE CASE-RECORDS

Case 1.—Housewife, aged 69, with four months' history of severe pain in right knee. Sleeping very poorly. The left knee appeared normal; the right knee could be actively flexed to 80°, and extension was full. Crepitus well marked. Radiography showed gross osteo-arthritis of both knees, with considerable osteophyte formation.

On Dec. 30, 1946, 10 ml. of lactic acid was injected into the right knee. A fortnight later the pain was less, she was sleeping better, and the range of movement was full. Two further injections were given. The patient was discharged after third injection with full painless range of movement and able to walk four miles without fatigue, whereas previously she could scarcely leave the house. She was seen again in August, 1947, when she was still symptom-free.

This is regarded as an example of "procaine effect"—i.e., auto-manipulation.

Case 2.—A music mistress, aged 65, with twenty years' pain in both hips and lower back, dating from menopause. Able to walk only a few hundred yards with two sticks. Sleep was almost impossible, and her occupation was continued with great difficulty. She walked with very short steps, the right foot being dragged level with the left and further progress made by swinging the left foot forward 6 inches. There was much lordosis. On examination there was no detectable movement in either hip-joint, though attempts to demonstrate this produced great pain. The knees were fully mobile; the lordosis was fixed. Radiography showed partial destruction of both femoral heads, very irregular acetabula, but some joint space discernible (fig. 2). There was gross osteo-arthritis of spine.

Solution II (procaine) 10 ml. was injected into left hip and 10 ml. of solution I (lactic acid) into right hip. A fortnight later, when the patient was seen, she was delighted with reduction in pain. She had slept through the night without waking. Left hip showed 5° of free painless flexion. Progress thereafter was steady. By August, 1947, she had had seven injections into each hip. She was feeling little pain and was walking comparatively well with 9-inch equal steps. Owing to the lordosis she still uses sticks.

This is an example of what can sometimes be done for a patient in whom the outlook seems hopeless.

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Case 3.—A farm labourer, aged 60, dragged by the leg by a horse seven years earlier. He apparently fully recovered and was on full work until a year ago when he began to feel an increasing dull gnawing pain in the right hip, often worse at night. Six months later he was unable to continue even light work. Physiotherapy did not help him. He was a very fine type of Essex countryman and was desperately anxious to work again. On examination his left hip was normal; the right hip had a range of 30° free flexion but no adduction deformity; crepitus was pronounced; there was wasting and gross loss of power of the thigh muscles. Radiography showed much loss of joint space, with osteophyte formation (fig. 3).

He was treated with solution 1 (lactic acid), and progress has been dramatic. By the end of August, 1947, he had had four injections. There was 80° of pain-free movement, but crepitus was still present. For the last three weeks of August he was doing five hours of hoeing a day but still feeling a little pain towards the end of day.

This was the perfect case for arthrodesis, but the patient is an excellent type and has achieved, at least temporarily, a good practical result without operation.

DISCUSSION

Owing to the shortage of hospital beds it has not been possible to admit patients for treatment, but with this limitation Waugh's technique has been closely followed. We have confirmed his discovery [3] that the normal synovial fluid has a pH of 7·4–7·6; that in the types of arthritis treated it tends to become alkaline; and that acidification with lactic acid renders the synovial fluid acid for at least two weeks. At the present stage of our work, however, we are by no means convinced that acidification has any real advantage. In our parallel series injected with neutral solutions the results have so far been just as good as those achieved by acidification.

We have found that the rate of improvement is greatest after the first few injections. Thereafter improvement tends to be far less spectacular and consists in the maintenance of the range of movement already achieved and in increasing the muscle power to control this movement. Since this depends so much on the active exercises, a tendency for the patient to lose heart at this stage must be watched for and counteracted.

While under injection treatment patients have received no other form of therapy. We regard this as most important not only from the scientific angle but also to impress on the patient that continuing success will depend on the conscientiousness with which he does his active exercises. Many of these patients have to undertake long cross-country journeys to reach the hospital. The comparative infrequency of attendance required for this treatment reduces such tiring journeys to a minimum and enables patients to carry on with their occupations without serious interruption. In this connexion, too, we have used an accurately timed appointment system, which reduces loss not only of work time but also of time spent waiting on a hard bench in the outpatient department.

We cannot believe that the improvement in function achieved so early in treatment is due to growth of joint cartilage. The improvement has occurred in joints in which the space was scarcely discernible on radiography. We find, however, that in most instances crepitus within the joint is, after injection, either reduced or totally absent. If an egg is placed in an egg-cup it is difficult to rotate it. If, however, a little water is sprinkled on it, as soon as it has formed a film over the surfaces in contact, movement becomes relatively easy. In our view this lubrication is a major feature in the success of the treatment.

This work has occupied only eighteen months. No patient under treatment has died, and therefore no necropsy material has been available; moreover, increase of joint space on a later radiogram has never been clearly shown. It would therefore be absurd for us to venture any opinion on the view that acidification encourages regeneration of joint cartilage.

3. Waugh, W. G. *Lancet*, 1936, ii, 976.

CONCLUSIONS

This treatment is so beneficial to those receiving it that every effort must be made to assess the reasons for this benefit. We present here our interim opinion on the treatment in the hope that others with greater facilities may prove or disprove the points raised.

We have so far found no evidence that intra-articular injection with acid fluid has any special advantage over solutions in which the pH is physiological.

The first two solutions used both contain procaine, and much of the value of the treatment may depend on this. This is especially true of patients who, after very few injections, have become symptom-free. We believe that such patients have broken down their adhesions while the joint is still "anæsthetic."

We are becoming more and more convinced that most of the benefit is the result of the lubricating action of the fluid. The recurrence of symptoms towards the end of the fortnight would correspond to the absorption of the fluid and the resumption of the original dry state of the osteo-arthritic joint surface. We are trying to find a fluid with a higher osmotic pressure and viscosity which will be retained longer within the joint and therefore not require so many injections. We are now trying solutions of mucin, which is present in normal synovial fluid, but it is too early to comment on this work.

It has been objected that, if our view is correct, all cases of arthritis with effusion should be painless, whereas they are often extremely painful. They are however only painful if acute inflammation is present, or if the synovial fluid is under tension and the capsule is being stretched. When too much fluid is injected into a joint, great pain can be, and has been, produced.

On the other hand, a joint which develops a quiet effusion into it is usually surprisingly painless. In two patients we have seen pain reduced by the development of an effusion. Some of our patients are now receiving normal saline, and so far the results have not been inferior to those obtained with either the isotonic or the acid procaine solutions.

A large measure of the benefit from this treatment lies, however, in the system by which it is achieved. The patient is receiving treatment which he believes to be good. The press has done much—almost too much—in helping him to this optimistic frame of mind. Nevertheless, optimism is not to be scorned, since so much of the benefit depends on his active coöperation. The "procaine effect" is immediate; hence the patient receives valuable early encouragement and can start his active non-weight-bearing exercises with the joint relatively painless. The absence of passive physiotherapy encourages him to realise that it is "up to him." Apart from the injection, there is no suggestion of passivity. He is told to get on with his job, and, apart from the warnings discussed above, he is told that the more he does within reason the better. He is encouraged to carry on with his work if this is suitable. He looks forward to his fortnightly visit, regarding it as a time for the careful assessment of progress, followed by the little "shot" which sends him off on the next lap. There is discussion among fellow sufferers, and a friendly and extremely helpful rivalry has grown up among the patients, tinged with deep understanding in their common problems.

The osteo-arthritic patient is told so often that nothing can be done for him that any regular treatment will for a time produce some symptomatic improvement as an accompaniment to the hope which is engendered.

We believe that, though all these latter points can be used as fuel for the fires of scepticism, they cannot be

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held responsible for all the benefit observed from this treatment.

Though this is only a small series it has enabled us to shape definite conclusions, since it has been small enough for us to come to know each patient intimately and to assess the individual results with real care. It is on the individual case that the value of the series must depend.

SUMMARY

The management of a clinic for administering intra-articular injections to arthritic patients is outlined.

Among 52 patients treated, most of them suffering from osteo-arthritis or the menopausal type of rheumatoid arthritis, 16 have been greatly improved and only 13 have shown no improvement.

An attempt has been made to compare the effects of the lactic acid and procaine solution recommended by Waugh with those of an isotonic solution of procaine and of normal saline. So far there has been no striking difference in the results obtained.

It is suggested that the benefit obtained is largely the result of the lubricating action of the fluid injected, but the optimistic and encouraging tone of the clinic also plays a valuable part. The immediate effect of the procaine is useful in allowing active exercises to be begun without much pain.

We wish to thank all those who have helped us in this work; the sister in charge of outpatients at Southend General Hospital and her staff for their enthusiasm and for many excellent ideas which have been incorporated into the routine of the clinic; Dr. D. H. Derry, Mr. D. Bradford, and their staff for the radiography; Mr. B. Whitchurch Howell, consultant in orthopædic surgery, for his advice and for helping some of our failures; Dr. H. F. Turney, who on his appointment to the hospital as consultant in physical medicine took our clinic under his wing and gave us encouragement and invaluable help in the preparation of this paper; and Mr. A. C. Adamson, pharmacist to the hospital, for his advice and for preparing the solutions used.

VIRULENCE OF GRAVIS STRAINS OF CORYNEBACTERIUM DIPHTHERIÆ

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AFTER four or five years' work on the differentiation of diphtheria strains by cultural methods into three main types, Cooper et al. (1936), in a review based on observations on a considerable collection of strains gathered up from areas in Britain and elsewhere, suggested that "typical" gravis strains are so constantly virulent that in most cases tests of virulence with such strains are superfluous and can be dispensed with.

This suggestion was supported by the independent observations of Robinson and Marshall (1934), who found only 3·1% of avirulent gravis among 97 strains collected in Manchester; Mair (1936), who found only 0·34% among 1214 strains; and Parish and O'Meara (1936), who observed 0·5% of avirulent strains in a collection of 366. McLeod in 1943 collected all figures available at that time on this question and found that 1·9% of avirulent strains had been described among 2697 examined.

The suggestions based on these findings gained acceptance in many quarters, and in some official memoranda on the diagnosis of diphtheria it was recommended that virulence tests with gravis strains should be omitted.

During the late war, however, Dr. V. D. Allison and Dr. G. H. Edwards, of Cardiff, drew our attention to the fact that non-virulent gravis strains were not uncommon in that city, and they sent us a collection of 12 such strains. When these were examined it was found that they presented many of the characteristics of gravis strains; an exception was that 11 of them showed a morphology distinct from that of the strains of this type commonly met in this country—they had well-developed metachromatic granules in recent cultures on blood-agar media. The 12th strain corresponded to the usual British strains of this type in that the metachromatic granules were poorly developed and the bacillary body stained uniformly. On retesting virulence the Cardiff finding was confirmed in respect of the 11 unusual strains, but the 12th killed the guineapig.

We were also informed about this time that non-virulent gravis strains had often been found in the Middle East; and, though we have not been able to trace any published work on this subject, a R.A.M.C. report which we saw through the courtesy of Major-General L. T. Poole mentions a collection of diphtheria strains from that area in which more than half the "gravis" were non-virulent. The number of strains on which this finding was based is not stated however, and it is suggested by other figures from the same source that gravis strains played a minor part in diphtheria in that area.

These observations and claims made it obviously desirable to have the whole question re-examined, and an endeavour was made accordingly to obtain a collection of supposed gravis strains from the Middle East and to compare these with collections of strains gathered as widely as possible in this country and from Europe through the B.A.O.R.

METHOD

The general plan of the investigation has been that all strains have been exchanged, some being examined first by Robinson in Liverpool and others first by McLeod in Leeds. The two investigators have determined the cultural type independently and carried out a virulence test. In Liverpool the intracutaneous test of virulence by skin toxin reaction has been used; in Leeds the death of the guineapig and post-mortem findings have been observed after subcutaneous injection of a quarter of the suspension from a Löffler slope culture. Immunological typing of all gravis strains has been carried out in Liverpool and the analysis of post-mortem findings in Leeds.

Through the valued coöperation of the Director-General of Medical Services, War Office, we have been able to gather a considerable number of strains from the B.A.O.R., and a smaller number from the M.E.F.; and with the generous help of bacteriologists of the Emergency Public Health Laboratory Service a large collection of strains from many parts of Great Britain has been obtained. Further, since the end of hostilities we have obtained collections from the civilian populations in Graz in Austria and Bergen and Oslo in Norway.

FINDINGS

There has been a very close correspondence between the two laboratories in their principal findings.

In the finer differentiation between gravis and atypical starch-fermenters there have been a few discrepancies due to the fact that broths of different composition have been used for determining pellicle formation, and that Robinson has put more weight on the aspect of colonies on fresh blood-tellurite-agar viewed by plate microscope and McLeod more weight on consistence of colonies on heated blood-tellurite-agar.

Robinson's methods have given a closer correlation between classification by colony on the one hand and immunological type and virulence on the other. They would, however, classify all starch-fermenting strains received from the Middle East as atypical, whether virulent or not.

It must therefore be understood that the term "atypical gravis" is used in Liverpool to indicate the appearance of colonies on unheated blood-tellurite-agar diverging from those

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of the two predominant immunological groups (Robinson and Peeney 1936); whereas in Leeds it is reserved for such strains as show smooth growth in broth and mitis-like colonies on heated blood-tellurite-agar.

Middle East.—From the Middle East we received 18 strains, of which 5 were discarded, as *C. diphtheriæ* had died out, and 5 were discarded as non-starch-fermenters. The remaining 8 are analysed in table I.

Germany.—From B.A.O.R. we received 32 strains, of which 1 did not ferment starch. The remaining 31 are analysed in table I.

TABLE I

Source	Virulence	Classification		Immunological group
		Robinson	McLeod	
8 STRAINS FROM MIDDLE EAST				
M.E.F. ..	6 V.	5 atyp., 1 starch neg. (*b*)	Gravis	5 gravis IV, 1 not examined
	1 N.V.	Atyp.	Gravis	? gravis IV
	1 D. (*a*)	Atyp.	Gravis	? gravis V
31 STRAINS FROM GERMANY				
B.A.O.R. ..	28 V.	28 gravis	26 gravis, 2 atyp.	23 gravis II, 5 not examined
	3 N.V.	3 atyp.	2 atyp.	1 gravis IV, 1 not examined
			1 gravis	1 inagglutinable
122 STRAINS FROM GREAT BRITAIN				
Liverpool ..	42 V.	42 gravis	42 gravis	42 gravis I
	1 N.V.	Atyp.	Atyp.	
	1 D. (*c*)	Gravis	Gravis	Gravis I
Glasgow ..	17 V.	17 gravis	16 gravis, 1 atyp.	17 gravis I
	1 N.V.	1 gravis	1 gravis	1 gravis I
Cardiff ..	11 V.	11 gravis	11 gravis	11 gravis I
	4 N.V.	4 atyp.	4 gravis	4 gravis IV
Newcastle and Northumberland	13 V.	13 gravis	13 gravis	11 gravis I, 1 gravis II, 1 D. (*d*)
Ipswich ..	6 V.	6 gravis	6 gravis	6 gravis I
Carmarthen ..	6 V.	6 gravis	6 gravis	6 gravis I
Carlisle ..	5 V.	5 gravis	5 gravis	5 gravis I
Epsom ..	5 V.	5 gravis	5 gravis	5 gravis I
Lincoln ..	4 V.	4 gravis	4 gravis	4 gravis I
Stafford ..	2 V.	2 gravis	2 gravis	2 gravis I
Middlesex ..	1 V.	1 gravis	1 gravis	1 gravis I
Derby ..	1 V.	Not done	1 gravis	Not examined
Peterborough	1 V.	1 gravis	1 gravis	1 gravis I
Aberystwyth	1 V.	1 gravis	1 gravis	1 gravis II
25 STRAINS FROM AUSTRIA				
Graz	24 V.	9 gravis, 1 atyp., 14 not exam'd	20 gravis, 4 atyp.	9 gravis II, 1 ? gravis V, 14 not examined
	1 N.V.	Atyp.	Atyp.	? gravis IV
24 STRAINS FROM NORWAY				
Bergen ..	12 V.	6 gravis, 6 not exam'd	12 gravis	6 gravis II, 6 not examined
Oslo	11 (*e*)	11 gravis	11 gravis	8 gravis II, 3 inagglutinable
	1 N.V.	Atyp.	Gravis	Gravis IV

V. = virulent. N.V. = non-virulent. D. = doubtful.

(*a*) Non-virulent by intracutaneous test; subcutaneous inoculations followed by death of guineapig with paralysis on 7th day—repeat observation failed.

(*b*) Only discrepancy in whole series between Liverpool and Leeds results on starch fermentation.

(*c*) Leeds test repeatedly negative; Liverpool test positive at outset.

(*d*) Typed as gravis I, but second test made it gravis II (? error in subculturing).

(*e*) One of these strains gave a + intracutaneous test and killed both rabbit and golden hamster when inoculated subcutaneously but did not kill guineapig (two tests).

TABLE II—SUMMARY OF VIRULENCE TESTS

Source	Starch-fermenters	Non-virulent	Non-virulent strains classified as gravis	
			Liverpool	Leeds
Continent of Europe	80	5	Nil (5 atypical)	2 (3 atypical)
Great Britain	122	6	1 (5 atypical)	5 (1 atypical)
Middle East	8	1	Nil (1 atypical)	1
Total ..	210	12 (5·7 %)	1 (0·48 %)	8 (3·8 %)

Great Britain.—All but 1 of the 123 strains received were starch-fermenters.

Austria.—The 25 strains were all from Graz.

Norway.—The 24 strains were from Bergen and Oslo.

The above results are summarised in table II.

The relationship of immunological group to virulence was as follows:

	No. of strains	*Non-virulent*
Gravis group I	112	1
,, ,, II	47	0
,, ,, IV	11	7
Inagglutinable or group doubtful	6	4

Thus, in a large collection of starch-fermenting strains gathered widely in Britain, Europe, and the Middle East, less than 6% of strains were non-virulent. If the criteria adopted in Liverpool are used, the proportion of strains accepted as gravis which prove to be non-virulent is quite negligible, even though a large proportion of the strains collected in Britain were taken intentionally from carriers and patients advanced in convalescence.

On the other hand there is a discrepancy between the Leeds and Liverpool results and between those of the present series and of earlier ones reported from Leeds and elsewhere in that between 3% and 4% of strains accepted as gravis in Leeds were found to be non-virulent. This discrepancy depends almost entirely on the small group of strains of the immunological group IV, and these in Great Britain were only found in Cardiff.

Since such group-IV strains predominated in the small collection received from the Middle East, it seems probable that their presence in Cardiff is explained by the considerable Asiatic element in the dock population of that city; all five such strains received directly from the Middle East were, however, found to be virulent.

Details of the non-virulent strains are given in table III.

Discrepancies between intracutaneous tests (Liverpool) for skin reaction and subcutaneous tests (Leeds) for death of guineapig have been negligible—only 3 instances (table IV).

Efficacy of Serum in Protecting Control Guineapigs from Virulent Strains Injected Subcutaneously

The control guineapigs received 1500–2500 units of antitoxin subcutaneously on the day before injection. Only 3 control guineapigs in the whole series of over 200 died (table V).

It was therefore clear that a large dose of antitoxin protected all guineapigs from all varieties of "gravis" strains examined.

Relative Virulence of Strains of Different Immunological Group

The facts that particularly severe epidemics of diphtheria appeared in Europe during the war, and that a distinct immunological group of "gravis" is predominant in Europe on the one hand and in Great Britain on the other, made a comparison of their relative pathogenic activities desirable.

The number of pathogenic group-IV gravis was too small to allow of a valid comparison, and the fact that the Continental strains included a larger proportion of strains

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from cases of diphtheria may invalidate the comparison between group-I and group-II gravis but probably does not, since very highly virulent strains were often recovered from carriers and some strains found non-virulent were obtained from clinical cases of moderate severity.

The results obtained by careful comparison of the post-mortem findings in guineapigs injected with group-I and group-II gravis are shown in table VI.

The lung lesion referred to above consists of patches of congestion and collapse distributed irregularly through the lungs, associated with œdema and, in the extreme cases, involving the greater part of both lungs. The bowel lesion referred to is considerable distension of the small bowel with sanguineous fluid, associated with congestion of the wall of the gut.

These data suggest that the group-II gravis strains produce more severe lesions in the guineapig, but they scarcely justify a definite conclusion.

TABLE III—NON-VIRULENT STRAINS

Source	Nature of case	Classification		Immunological classification
		Liverpool	Leeds	
Liverpool	Carrier	Atypical	Atypical	Inagglutinable
Glasgow	Case of moderate severity, unimmunised	Gravis	Gravis	Group I
Cardiff	Carrier	Atypical	Gravis	Group IV
Cardiff	Contact	Atypical	Gravis	Group IV
Cardiff	Clinical diphtheria	Atypical	Gravis	Group IV
Cardiff	Carrier	Atypical	Gravis	Group IV
B.A.O.R.	Ulcerated tonsil	Atypical	Atypical	Not examined
B.A.O.R.	Tonsillitis	Atypical	Atypical	Group IV
B.A.O.R.	Case of moderate severity in adult	Atypical	Gravis	Inagglutinable
M.E.F.	No information	Atypical	Gravis	? group V
Graz ..	Case of moderate severity	Atypical	Atypical	? group IV
Oslo ..	No information	Atypical	Gravis	Group IV

The combination of rather more severe lesions with a lesser tendency to persist in the animal body (lower percentage of recoveries of Klebs-Löffler bacilli in the local lesion) might be interpreted as evidence of higher toxin-forming capacity in these strains.

Evidence of Penetration of C. diphtheriæ *Beyond Local Lesion.*—Cultures were made from the heart blood of every inoculated guineapig which died, and in a few cases also from the lungs. *C. diphtheriæ* was recovered in only 6 instances. These positive cultures were from the heart blood—5 were scanty and 1 abundant. All were group-I strains. A few of these strains were re-examined later but were not again recovered from the heart blood.

SUMMARY

In 1943–45 more than 200 starch-fermenting strains of *C. diphtheriæ* were collected—from western and central Europe, through the B.A.O.R., including a considerable number from civilians in Austria; England and Wales, from 13 different and widely scattered cities and areas; Scotland, from Glasgow; Norway, from Bergen and Oslo; and from the M.E.F., through the War Office, presumably collected in the eastern Mediterranean area.

TABLE IV—DISCREPANCIES

Source and nature of strain	Leeds results	Liverpool results
Liverpool, gravis group I, clinically tonsillitis	4 guineapigs, 1 rabbit, 1 hamster } All negative	Positive
M.E.F. classified by Leeds as gravis, by Liverpool as "atypical ? group V." No clinical details	1st guineapig died 7th day with paralysis and post-mortem evidence of diphtheria death; 2nd guineapig, 1 rabbit, 1 hamster } All negative	Negative
Oslo, gravis group II ..	2 guineapigs negative, hamster died 2nd day, rabbit died 3rd day	Positive

TABLE V

Source and nature	Necropsy findings in protected guineapig
Glasgow, group I gravis, from carrier	Died 4th day; no diphtheritic lesions; a few coliform bacilli recovered from heart blood
Cardiff, group I gravis, clinical	Died 2nd day; no diphtheritic lesions; a few coliform bacilli recovered from heart blood
M.E.F., group IV gravis, no clinical details	Died 2nd day; hæmorrhagic phenomena and liver necrosis; heart blood sterile; local lesion scanty K.L.B.; repeated on four guineapigs receiving no antiserum—100 units, 500 units, 1500 units; only the unprotected guineapig died

As in the earlier work of Robinson and Peeney (1936), it was found that the immunological group I predominated in Britain and the group II in Europe. Among these the number of non-virulent strains was negligible. In the Middle East immunological group-IV strains predominated, and all these were virulent. The number of strains from this area, however, was too small for this finding to have the same significance.

Among inagglutinable strains and the small number of strains of group IV found in this country or in Europe there was a majority of non-virulent strains.

Over all, 5–6% of starch-fermenting strains were found to be non-virulent; some of these were classified as atypical on criteria of appearance in culture, but in respect of the group-IV strains there was a discrepancy between the findings in Liverpool, where they were described as atypical, and in Leeds, where they were passed as "gravis."

This discrepancy held equally for the non-virulent strains mostly received from Cardiff and the virulent strains of the same type received from the Middle East.

If only those strains classified as atypical by both observers are excluded, there are left just under 4% of "gravis" strains found non-virulent in a large collection gathered from many widely separated areas and including a large proportion of strains from carriers and convalescents.

TABLE VI

—	British gravis group I	Continental gravis group II (including 2 strains from Great Britain)
No. of strains	111	47
Non-virulent	1	0
Doubtful virulence	1	0
Post-mortem lesions:		
Well-marked local lesion	75%	85·1%
Hæmorrhagic phenomena well marked	58%	57·5%
Œdema marked	61%	72·3%
Lung lesion marked	54%	66%
Liver necrosis marked	19%	25·5%
Bowel lesion marked	14%	23·4%
Recovery of *C. diphtheriæ* from local lesion at death	66%	55·3%
Average survival (hr.)	25·4	25·5

This means that not more than 1 out of 26 such strains tested is likely to prove avirulent.

In view of the time and expense involved in such tests, it seems justifiable to continue to restrict them to strains obtained from carriers of long standing or from diphtheritic lesions in unusual areas—e.g., wounds.

There remains the possibility of the existence of areas similar to Cardiff in providing a considerable proportion of starch-fermenting strains other than those belonging to the two predominant immunological groups. For such strains virulence tests will be required.

This work could not have been carried out without the coöperation of Major-General L. T. Poole and other medical authorities at the War Office and of Prof. G. S. Wilson of the Public Health Laboratory Service, and to these and a great number of pathologists in both Services we wish to express

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our appreciation. We are also indebted to Lieut.-Colonel Scott Thomson for a collection of strains from the civilian population of Graz and to Dr. Th. M. Vogelsang and Dr. E. S. Tønnessen for collections from Bergen and Oslo. Thanks are also due to Miss D. Peace, Miss S. Chapman, Mr. J. McAvoy, and Mr. R. Burrow, of the departmental staff in Leeds, and to Mr. W. Coackley in Liverpool for much painstaking work.

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PHALANGEAL METASTASES IN BRONCHOGENIC CARCINOMA

REPORT OF THREE CASES

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CARCINOMA of the bronchus is notorious for the frequency and diversity of its metastases (Ewing 1940), which Ask-Upmark (1932) attributed to the easy access of the growth to the pulmonary veins and thence to the systemic arteries. Scarff (1937) described a case of carcinoma of the colon with metastases in a rib and a phalanx, and Smithers and Price (1945) described a case of primary carcinoma of a bronchus with a metastasis in a terminal phalanx. We have been unable to trace any other reference to phalangeal metastases.

The metastasis described by Smithers and Price presented as a painful and fluctuating swelling suggesting a whitlow, and a metastasis was diagnosed after aspiration biopsy, when an anaplastic squamous-celled carcinoma was found on histological examination.

We have recently encountered three such cases, which are described below. The first was in a female patient with a primary carcinoma of the bronchus and widespread metastases which included deposits in three of the terminal phalanges of the fingers. The second was in a tabetic male, in whom the first signs of malignant disease were the appearance of metastases in a phalanx and a metatarsal. The third was in a male with signs suggesting a bronchial carcinoma and a metastasis in the left great toe.

Case 1.—A married woman, aged 65, was admitted to the Middlesex Hospital on Aug. 21, 1946. She had had a cough for two years and more recently a hæmoptysis followed by shortness of breath, loss of weight, and pain in the left lower chest, shoulder, and neck, and had noted small lumps in the skin.

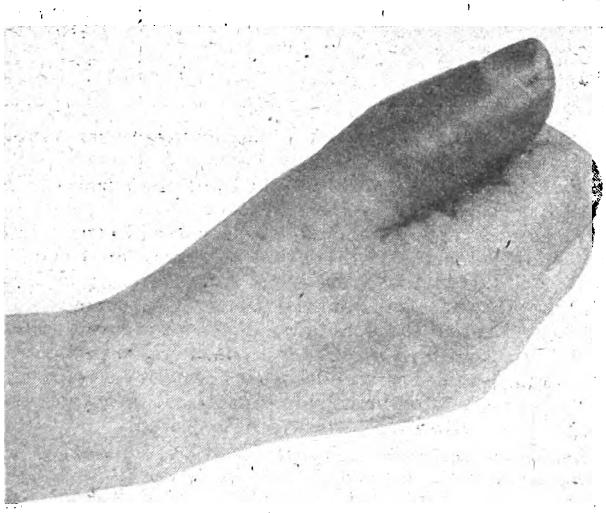

Fig. 1—Metastasis in right thumb, showing swelling and discoloration (case 1).

On examination she was a well-covered woman with slight dyspnœa. The fingers were clubbed, and there were signs of a left-sided pleural effusion. There were several hard nodules in the skin and subcutaneous tissue of both arms, the chest, and the anterior abdominal wall, varying in size up to $^1/_2$ in. in diameter. No enlarged glands were felt, and nothing abnormal was found in the cardiovascular, alimentary, and central nervous systems.

Radiography of the chest confirmed the presence of a left-sided pleural effusion. Paracentesis of this yielded blood-stained fluid, which contained red blood-cells and leucocytes and was sterile on culture. Histological examination of the deposit showed cells which appeared to be malignant. A biopsy of a skin nodule showed spheroidal-celled carcinoma.

On Sept. 9 the patient complained of pain in the tip of the left fourth finger, which was red and swollen, resembling a paronychia. Next day the signs had increased out of proportion to the pain, and a radiogram showed almost complete necrosis of the terminal phalanx, of which only the proximal end remained, whereas the distal interphalangeal joint was unaffected and there was no periosteal reaction. This suggested a metastasis rather than inflammation.

On Sept. 23 the tip of the right thumb became tender, swollen, and red (fig. 1), and a radiogram (fig. 2) showed the same changes as in the left fourth finger.

During the next six weeks several new skin nodules appeared, and some of the earlier ones ulcerated. Finally a metastasis formed in the tip of the left thumb, the clinical and radiological signs being the same as in the previously affected phalanges.

The patient died on Oct. 3.

Fig. 2—Radiogram showing metastasis in terminal phalanx of right thumb (case 1).

Necropsy Findings.—Bronchi: a lobulated mass of firm pale growth arose from the left lower lobe bronchus 1 cm. from its origin and extended into the adjacent hilar pulmonary tissue.

Pleuræ: the left pleural sac contained 12 oz. of amber fluid. Growth extended from the diaphragmatic surface of the left lung to the adjacent pleura.

Lungs: both were congested, and the left lower lobe was collapsed.

Stomach: two submucous nodules, 0·5 cm. and 1 cm. in diameter, were present in the gastric body.

Liver contained multiple metastases.

Adrenals: nodule of growth, 0·5 cm. in diameter, was present in the right adrenal.

Bones: the skull vault was completely destroyed in the region of the inion over an area 4 cm. in diameter. Osteolytic metastases were present in the terminal phalanges of both thumbs, the left fourth finger, the left second rib, and the lower end of the right femur.

Meninges: extensive plaque-like deposits of growth were found in the extradural tissues in the region of the inion.

Brain normal.

Lymph-glands: only the regional hilar glands were invaded by growth.

Histology.—A section of the bronchial growth showed mixed polygonal-celled, squamous-celled, and oat-celled carcinoma. The growth was predominantly of undifferentiated polygonal type.

A section of the terminal phalanx of the fourth left finger showed almost complete substitution of the bone of the

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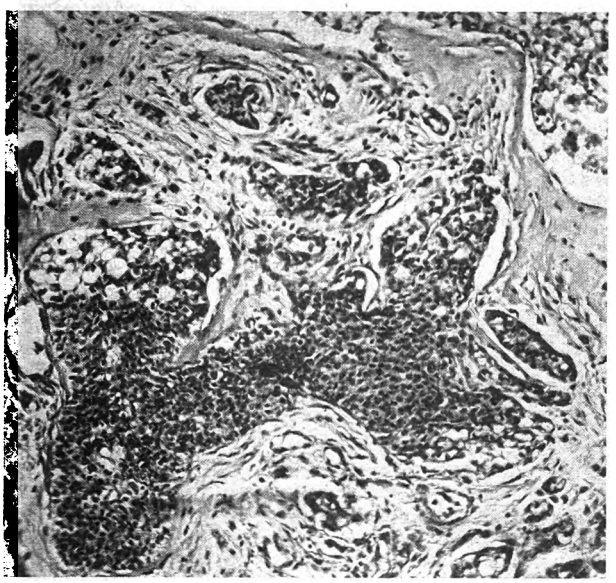

Fig. 3—Section of metastasis in left fourth terminal phalanx showing replacement of bone by masses of carcinoma cells (case 1). (× 110.)

terminal phalanx by solid masses of carcinoma. Most of the cells were undifferentiated and of polygonal type, but there were some areas of tubule formation (fig. 3).

Case 2.—A married man, aged 55, was admitted to the Middlesex Hospital on Oct. 14, 1946. He said that, six weeks before, he had woken one morning to find that his right foot was swollen and slightly painful. This had persisted, and a week later he had noted a similar change in the tip of the left thumb. For some years he had been unsteady in his gait, particularly in the dark. He had no pulmonary symptoms. He denied a previous history of syphilis.

On examination he was of good physique, but with clubbed fingers. There were no abnormal signs in the cardiovascular, respiratory, and alimentary systems. He showed classical signs of tabes dorsalis, which explained his difficulty in gait.

The distal third of the left thumb was swollen, hot, dusky red, and firm, with expansile pulsation, but only slight tenderness. The dorsum of the right foot was œdematous, hot, red, and slightly tender over the third metatarsal shaft. There were no enlarged lymph-glands.

Radiography showed destruction of the terminal phalanx, except for the base, in the left thumb; destruction of the middle metatarsal shaft extending up to but not involving the joint space, with moderate soft tissue swelling, and osteoporosis of the other tarsal and phalangeal bones in the right foot (fig. 4); and chest normal.

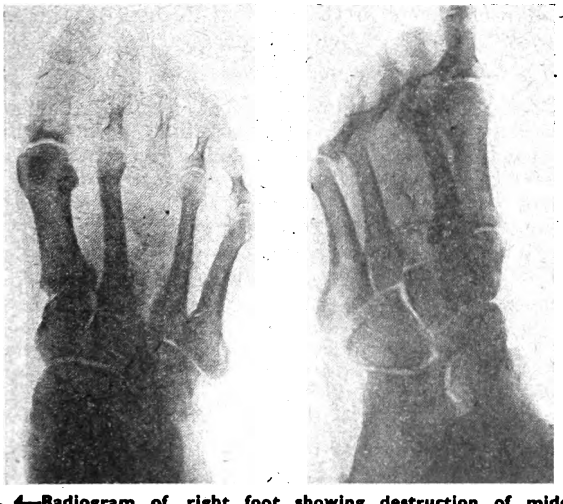

Fig. 4—Radiogram of right foot showing destruction of middle metatarsal by metastasis (case 2).

Blood-count normal, Wassermann reaction negative, and serum-phosphatase levels alkaline 32·1 units per 100 ml. (normal up to 13) and acid 2·3 units per 100 ml. (normal up to 2·5). Bronchoscopy normal.

Aspiration biopsy of the thumb showed polygonal-celled carcinoma with areas of squamous metaplasia, suggesting a primary growth in a bronchus.

Treatment and Course.—The metastases in the thumb and foot were treated by radiotherapy, which was followed by a decrease in the size and the tenderness of the lesions, allowing the patient to walk.

Radiography of the chest on Dec. 29 showed a partial atelectasis in the left mid-zone and some widening of the superior mediastinum as compared with the previous film. The clubbing of the fingers became more obvious, and the patient's weight fell by almost a stone before his discharge on Dec. 31. At this time he had no thoracic symptoms and no clinical, as distinct from radiological, signs of a bronchial carcinoma.

His family doctor reported that the patient died suddenly in January, 1947. No necropsy was made.

Case 3.—A man, aged 53, was admitted to the Royal South Hants and Southampton Hospital under the care of Dr. A. G. C. Taylor on Oct. 17, 1946. He complained of six months' pain in the left big toe, and four months' cough and shortness of breath. A week before admission he had had a streak of hæmoptysis.

On examination he was a thin man, with a large tender fluctuating mass over the dorsal and medial aspect of the head of the first left metatarsal, with thinning and redness

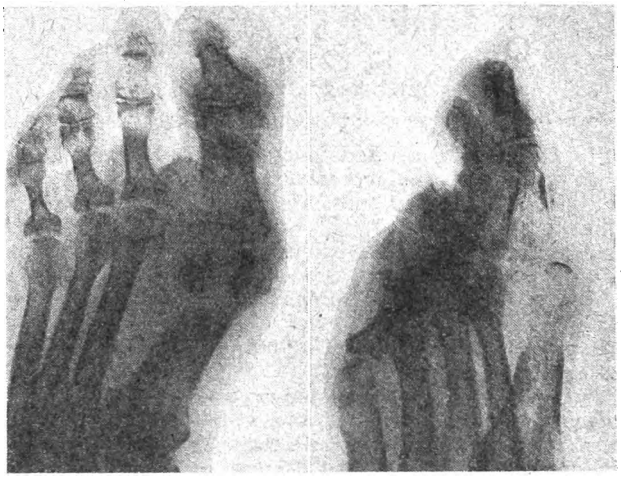

Fig. 5—Radiogram of left foot showing destruction of the first metatarsal and first phalanx by metastasis (case 3).

of the skin. There were signs of a large left-sided pleural effusion, and the left supraclavicular glands were enlarged. No other enlarged glands were found.

Radiography showed an osteolytic process in the left foot involving the head of the first metatarsal and the base of the first phalanx with some new bone formation with soft tissue swelling around this area (fig. 5); a uniform opacity throughout the left chest, with elevation of the diaphragm and displacement of the trachea and mediastinum to the left.

Aspiration biopsy of the toe yielded sterile pus containing malignant cells. Paracentesis of the left pleura confirmed the presence of fluid, which was not histologically examined.

Patient died at home a short time later. No necropsy was performed.

DISCUSSION

In all three cases the phalangeal metastases closely resembled clinically an inflammation and were initially assumed to be due to a paronychia or whitlow in cases 1 and 2 and an infected bunion in case 3. The relative mildness of the pain in case 1 threw doubt on the diagnosis until radiography showed the real nature of the lesion. The expansile pulsation of the thumb in case 2 showed the considerable vascularity of the metastasis. The radiological changes were essentially similar in all three

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cases, and aspiration biopsy proved helpful in the diagnosis in cases 2 and 3. Necropsy confirmed the presence of a primary bronchial carcinoma in case 1. In cases 2 and 3 it seems probable that the primary lesion was a carcinoma of the bronchus, in view of the evidence of lung involvement and of the histology of the biopsy material in case 2.

In cases 2 and 3 there was a delay of six and of eight weeks between the onset of symptoms caused by the bony metastases and the appearance of signs of pulmonary involvement. Such a delay is by no means uncommon; Hirsch and Ryerson (1928) described two cases in which the delay was six and sixteen months.

We wish to thank Dr. G. E. S. Ward, Dr. D. McAlpine, and Dr. A. G. C. Taylor for permission to record these cases; Prof. James McIntosh, Prof. R. W. Scarff, and Dr. A. C. Thackray for reports on the morbid anatomy and histology; Dr. H. K. Graham-Hodgson for the radiological investigations; and Mr. E. Bridger and Mr. J. Kilshaw for the photographic work.

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VITAMIN E IN ANGINA PECTORIS

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IT has been suggested (Vogelsang and Shute 1946) that vitamin E relieves the pain and improves the exercise-tolerance of patients with angina pectoris. Shute (1942) observed that this drug dilated the local capillaries in senile vulvitis, and he suggested that in angina pectoris it acted as a coronary vasodilator. An alternative hypothesis, supported by the independent experimental work of Govier et al. (1946), was that vitamin E had a beneficial influence on the metabolism of cardiac muscle.

Sudden death has been noted in cattle with a deficiency of vitamin E (Gullickson and Calverley 1946). This was attributed to cardiac damage, and in one animal electrocardiography showed changes in the P–R interval, low-voltage prolonged QRS complexes, and changes in axis-deviation. Atrophy and scarring of the cardiac muscle, with increase in the cellular elements, were found at necropsy. Supporting this hypothesis is the observation that animals with muscular dystrophy, artificially induced by diets deficient in vitamin E, die of cardiac failure. The published work on this subject, however, is not critical, nor are the observations adequately controlled, and the questions asked in the *British Medical Journal* (1946) regarding the efficacy of vitamin E in angina pectoris led us to carry out a clinical trial.

Our series consisted of twenty-two patients (17 men and 5 women), aged 44–66, and our technique was based on that of Evans and Hoyle (1933), only patients having frequent attacks of typical anginal pain being included. All had a negative Wassermann reaction, and patients with thyrotoxicosis or with a hæmoglobin less than 90% (Haldane) were excluded. Because of the possible occurrence of further small thromboses which might influence our results, no patient who had clinical or electrocardiographic evidence of coronary thrombosis in the previous six months was included.

Patients received vitamin E ('Ephynal,' Roche) 50 mg. t.d.s., or phenobarbitone gr. $^1/_2$ t.d.s., or aminophylline 0·1 g. t.d.s., or calcium lactate gr. 5 t.d.s. (as a control). Since 90 mg. of α-tocopherol acetate a day has been shown to raise the blood level, the dose we used should have been sufficient to produce therapeutic effects. Each drug was given for three weeks, and the patients were seen at the end of each period. They did not know which of the drugs they were taking; nor was the order of administration the same in each case. All other therapy ceased during the period of investigation.

A detailed history of the factors causing pain was taken in each case, and the frequency of attacks was estimated. At each subsequent visit the patient was questioned about changes in frequency or precipitating factors, any unusual symptoms which could be ascribed to the drug were noted, and the patient was asked to give his opinion of the effect of the drug on his general condition. At the end of the investigation the patient was asked which of the drugs produced the greatest benefit.

TABLE I—EFFECTS PRODUCED BY DIFFERENT DRUGS ON ANGINA PECTORIS

Result	Vitamin E	Phenobarbitone	Aminophylline	Calcium lactate
Better ..	10	10	8	4
No change ..	6	8	8	9
Worse ..	6	4	6	9

The results shown in table I suggest that vitamin E is no more beneficial than phenobarbitone or aminophylline, and our observations support the conclusion of Evans and Hoyle (1933) that none of these drugs is of much value in the routine treatment of angina pectoris. Table II suggests that phenobarbitone is the most useful and diminishes the liability to anginal attacks, as suggested by Bramwell and King (1942). Among the patients who found vitamin E the most beneficial no common factor was noted in the electrocardiogram, blood-pressure, age, blood-cholesterol, length of history of the disease, size of heart as measured in the teleradiogram, or family history.

As regards possible toxic manifestations of vitamin E, one patient complained of a dry feeling in the throat, two had increased headaches, and one noted pronounced vasodilator effects in the form of flushing of the face, throbbing headaches, and giddiness.

TABLE II—DRUG PRODUCING MOST BENEFIT IN ANGINA PECTORIS

Patients	Vitamin E	Phenobarbitone	Aminophylline	Calcium lactate
Men (17) ..	6	8	3	0
Women (5) ..	0	2	1	2

SUMMARY

Twenty-two patients with typical angina of effort were treated with vitamin E, phenobarbitone, aminophylline, and calcium lactate, each drug being given for 3 weeks, after which the patients were asked to compare the effects of the drugs.

From this small but clinically significant series it is concluded that vitamin E is not of any therapeutic value in the routine treatment of angina pectoris.

We wish to thank Prof. Crighton Bramwell for his interest in the investigation and for allowing us to use his cases, and Messrs. Roche Products Ltd. for the supply of ephynal.

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RECURRENT AGRANULOCYTOSIS

REPORT OF A CASE

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LATELY E.M.S. PATHOLOGIST, CARMARTHEN

THE reported cases of recurrent agranulocytosis are not numerous. A well-known American example was reported by Rutledge et al. (1930), who described attacks recurring at intervals of three weeks in a male from the age of 2½ months to manhood. The symptoms included sore mouth and throat, pyrexia, listlessness, and gastro-intestinal upset. In early manhood diabetes insipidus developed and responded to treatment with posterior pituitary extract. The patient excreted large fluctuating amounts of female sex hormone, the amount being low during neutropenia, when he also excreted excess of prolan. Before and during attacks there was an agranulocytosis. During the attack the number of lymphocytes and eosinophils increased; monocytes increased in number at the height of an attack; abnormal lymphocytes were present early in the attack, and immature granulocytes at the end of an attack. 'Pentnucleotide' was effective in aborting attacks. Jackson and Merrill (1934) reported the case of a woman, aged 30, who had recurrent attacks of ulceration of the mouth accompanied by agranulocytosis, coinciding with the first day of the menstrual cycle. Attacks were treated with 'Antuitrin S' and pentnucleotide but became successively worse, and the patient died. Embleton (1937) described a case in a woman of 43, who had buccal ulcers and fever every thirty days, but her attacks were unrelated to the menstrual cycle. Agranulocytosis preceded the attacks, and the red-cell count fell by about 1,000,000 cells per c.mm. during attacks, when the number of platelets increased. Treatment with pentnucleotide, liver, iron, and vitamins had no effect. He also mentioned 2 cases of recurrent buccal ulceration accompanied by a fall in the red-cell count but with no alteration in the white-cell count; the cycle in one case was twenty days. Thompson (1934) collected 40 cases of agranulocytosis, and 35 were in females, 25 of whom were of menstruating age. In 17 of the 25 the onset coincided with the start of a menstrual period, and 6 of these had a recurrence also at the start of a period.

CASE-RECORD

A jeweller, aged 79, with no past history of illness, had two attacks of tonsillitis in 1942 and 1943, but no investigations were made. An attack of tonsillitis accompanied by agranulocytosis developed in July, 1944. Further attacks of tonsillitis and agranulocytosis developed at successive intervals of eighteen weeks, four weeks, four weeks, and five weeks. A year later, after freedom from illness, he had a similar attack and died. Permission for necropsy was not given. Two operations for hernia had been performed three years previously.

Habits.—For three years the patient had been on a self-imposed milk diet for gastric pain. This diet was deficient in iron, protein, and vitamins. From July, 1944, he took a full diet with added vitamin C. He took aspirin every night for insomnia, and often took 'Allonal,' but he stopped taking both after his second attack in December, 1944. He cleaned watches with benzene.

Description of Attacks.—The throat was intensely painful. The tonsils and fauces were very inflamed and covered with sloughs and ulcers. The patient felt extremely ill and his temperature was high. These acute symptoms were preceded by a few days' malaise. Symptoms lasted nearly a week. There were no other abnormal physical findings.

Bacteriology.—No Vincent's organisms, hæmolytic streptococci, or *C. diphtheriæ* were found in swabs from the throat.

Treatment.—Full diet. Massive doses of vitamin C. Pentnucleotide.

Condition Between Attacks.—Perfectly fit. Physical examination revealed no abnormality.

Blood-counts.—Of the numerous white-cell counts made, those in the table have been selected to show some relevant points. It is to be noted that (1) the granulocyte-count fell before symptoms developed, while the patient felt vaguely unwell; (2) the fall in granulocytes was gradual and progressive between attacks, and a final more sudden fall initiated an attack; (3) the lymphocytes and sometimes the monocytes were more numerous between attacks; (4) a polymorph leucocytosis developed about a week or ten days after an attack, but was not maintained (a few primitive granulocytes were present at such times); (5) lymphocytes and monocytes appeared normal in character; and (6) treatment was given as soon as acute symptoms appeared, wherefore the effect of this on the blood-count must be taken into consideration.

There was no significant variation in the red-cell count or in the hæmoglobin, which was 70–80%. A bone-marrow smear taken on Jan. 26, 1945, when the polymorph-count was falling, and three days before an attack, showed a complete absence of immature cells of the granulocyte series.

Possible ætiological factors in the present case were (1) a diet low in vitamins, iron, and protein; (2) aspirin; (3) allonal; and (4) benzene. Allonal alone, which contains amidopyrine, is known to be a possible cause of agranulocytosis. The patient did not admit to taking any of this after December, 1944, when he had had two attacks; and four more attacks developed later. The possibility of his having taken a tablet without disclosing the fact must be borne in mind since, once he had become sensitised to amidopyrine, he might react to a small dose. The hormonal connexion in some of the cases quoted above seems remote from this case in a man of 79. Though there were six, and possibly eight, attacks, there appeared to be no definite cycle, except that three attacks were at about monthly intervals. The agranulocytosis preceding symptoms suggests that the absence of polymorphs may have allowed normally harmless organisms to produce the ulceration of the mouth.

WHITE-CELL COUNTS

Date	Total white cells per c.mm.	Polymorphs (%)	Lymphocytes (%)	Monocytes (%)
1944				
July 25	1600	2	76	22*
,, 29	14,300	45	28	7
Dec. 1	3450	22	48	30*
,, 5	15,600	50	35	15
,, 15	10,850	74	23	3
,, 29	1700	0	84	16*
,, 31	3900	23	53	24
1945				
Jan. 2	7850	41	43	16
,, 5	21,000	44	40	16
,, 12	11,300	64	27	9
,, 22	4900	68	31	1
,, 26	3300	6	91	3
,, 27	3950	0	96	4
,, 29	3800	2	90	8*
,, 30	2650	10	81	9
Feb. 3	9000	36	44	20
,, 6	10,900	61	29	10
,, 10	12,800	71	23	6
,, 15	8200	58	29	13
March 2	15,000	41	58	1
,, 6	650	1	99	0*
,, 9	4000	7	83	10
,, 15	10,000	37	54	9
,, 20	23,250	71	27	2
April 5	4000	25	66	9
,, 26	7300	44	47	9
May 29	13,000	46	40	14
June 26	12,650	51	45	4

* Attack.

SUMMARY

Six attacks of agranulocytosis occurred in a man of 79 over a period of 18 months. The attacks were accompanied by ulceration of the throat. The man had lived on a restricted diet, had taken aspirin and allonal, and used benzene in his work.

This patient was under the care of Mr. J. R. E. James, F.R.C.S.E., at whose request I made the above investigations.

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Reviews of Books

Postgraduate Obstetrics

WILLIAM F. MENGERT, M.D., professor of obstetrics and gynecology, Southwestern Medical College, Texas. London: Hamish Hamilton. 1947. Pp. 373. 25*s*.

VIGOROUS common sense is the keynote of this refreshing little book. Some knowledge of the subject by the reader is taken for granted, and the pages are full of sound and comforting advice. This is particularly true of the section on the treatment of the minor ailments of pregnancy. There are, of course, sizeable gaps, but most of these are at the expense of very rare conditions. In the management of cases of diabetes, and of disproportion, more definite and detailed instruction would have been welcome, especially in a book otherwise so downright, and the description of trial labour would hardly encourage the practitioner to allow his patient more than a few grunts before dashing into cæsarean section. Eclampsia is dogmatically dealt with, the chapter ending with a list of "don'ts"—such as "Don't administer chloroform or other inhalation anesthetic to control convulsions; it is useless." Cæsarean section is roundly condemned as doubling the eclamptic patient's chances of dying.

Professor Mengert's racy and invigorating style, and his irony, might well be copied in other textbooks. Writing of episiotomy suture, he says: "Immediate repair tends to minimize the blood loss from the perineal wound and to prevent meddlesome interference with the uterus during the third stage by directing attention elsewhere." His conservatism should be salutary for those who tend to jump out of obstetrical difficulties, often at the patient's expense, by resorting to cæsarean section. This operation should never be the last resort of the desperate, inasmuch as the obstetrician should never be desperate; and good midwifery is a test of character rather than of manual dexterity. But perhaps he carries the "sit tight" policy too far when he advises that, in dealing with a breech with extended legs, intervention should begin only after the birth of the umbilicus "or if labour has been at a complete arrest for several hours in the second stage." The book, though it may not help students to pass examinations, will greatly help doctors to practise sound obstetrics.

Medical Research

A Symposium. Editor: AUSTIN SMITH, M.D. London: J. B. Lippincott. 1947. Pp. 169. 25*s*.

THOSE who talk glibly of the successes and failures of "science," and of medical research in particular, are usually poorly informed on the opportunities and motives of the researcher, or the conditions under which he works. This book, not a popular work and (except for a chapter on medical photography) free from padding, should be put in the way of those in the political and academic worlds to whom the ultimate call for financing research ascends. Although written for an American audience—possibly with one eye on the current debates on the National Research Foundation—its fair and dispassionate review of the problems of organising medical research applies equally to conditions in this country.

Treponematosis

ELLIS H. HUDSON, M.D., D.T.M. & H., director, health service, Ohio University. London: Oxford University Press. 1947. Pp. 122. 12*s*. 6*d*.

THIS is a spirited and well-documented defence—reprinted from the *Oxford Loose-Leaf Medicine*—of the thesis that "treponematosis is a universally distributed disease caused by *Treponema*, a genus with one species, *pallidum*": yaws is the primitive form and syphilis the sophisticated form. A long historical section traces the development of the disease from ancient times in Africa, whence it spread to Asia, Europe, and America. Incidentally, this unitarian concept of treponematosis provides a strong case against the popular view that syphilis was introduced into Europe by Columbus, as the contention is that "the venereal character of this form of treponematosis was not due to its sudden importation in Europe by a shipload of explorers but rather to the gradual development in Europe of a fabric of human life so hygienic that primitive and transitional forms of the infection were screened out and the opportunities for sexual transmission proportionately increased." It cannot be claimed that the author has made out a watertight case for his thesis, but he has certainly collected and analysed an impressive mass of data which should be especially studied by syphilologists and by all concerned with the treatment of disease in the tropics.

Common Skin Diseases (8th ed. London: H. K. Lewis. 1947. Pp. 476. 21*s*.).—The eighth edition of Dr. A. C. Roxburgh's well-known work has been brought up to date. The treatment of lupus vulgaris with calciferol has been included, and the sections on penicillin have been revised in the light of the author's further experience. This is essentially a student's textbook, and is deservedly popular.

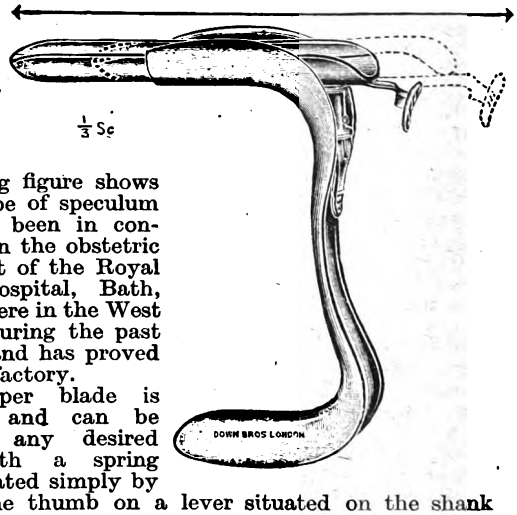
The Medical Annual (65th year. Bristol: John Wright. London: Simpkin Marshall. 1947. Pp. 464. 25*s*.).—Sir Henry Tidy and Prof. A. Rendle Short, F.R.C.S., as usual lead an impressive team of contributors in the current annual; and the work serves its well-tried purpose as ably as ever. Among new agents used in medicine streptomycin and tracer substances are discussed, and there are up-to-the-minute accounts of advances in surgery and anæsthesia.

Vital Statistics and Public Health Work in the Tropics (2nd ed. London: Baillière. 1947. Pp. 268. 15*s*.).—Growing interest in Colonial affairs assures a ready welcome for the new edition of Dr. P. Granville Edge's book. He begins with some learned if somewhat discursive essays on the problems that arise in the compilation of basic statistics of population, birth, death, and sickness, writing from personal experience and from a wide knowledge of published work. In particular, he emphasises the need to consider local customs and conditions when interpreting all figures. The book closes with a brief history of vital statistics in the West, from early beginnings till the death of Farr; and Prof. M. Greenwood, F.R.S., contributes a vigorous note on our Imperial neglect of the whole subject.

New Inventions

AN EXTENSIBLE SIMS' SPECULUM

SURGICAL induction of labour is best accomplished under vision, but this is not always easy, especially in the multiparous patient where the cervix is hidden by thick folds of vagina which tend to envelop the speculum of average size.



The accompanying figure shows a Sims' type of speculum which has been in constant use in the obstetric department of the Royal United Hospital, Bath, and elsewhere in the West Country, during the past 4½ years and has proved most satisfactory.

The upper blade is extensible and can be fixed at any desired length with a spring catch operated simply by pressing the thumb on a lever situated on the shank below the blade. The entire blade is removable for cleaning purposes and is easily reassembled.

The instrument is made by Messrs. Down Bros. and Mayer & Phelps Ltd.

Bath. A. LEECH-WILKINSON, F.R.C.S.

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THE LANCET

LONDON: SATURDAY, JAN. 17, 1948

Continuation of N.H.I.?

THE British Medical Association's special representative meeting, reported on another page, proceeded to its foregone conclusion, and the following statement was afterwards issued:

> "The elected representatives of the Medical Profession in Great Britain and Northern Ireland meeting in London this 8th day of January, 1948, solemnly declare that in their considered opinion the National Health Service Act, 1946, in its present form is so grossly at variance with the essential principles of our Profession that it should be rejected absolutely by all Practitioners."

The association's positive opposition to participation in the National Health Service is conditional, however, on the results of a plebiscite to be held on Jan. 31. In this plebiscite all doctors, including those on the Temporary Register, will be asked whether they approve of the Act—a question on which the answers could be variously interpreted. (Hardly anybody approves of everything in the Act, and disapproval might be expressed both by those who think it goes too far and by those who think it does not go far enough. Moreover, it is not quite clear whether acceptance of the Act will be held to mean acceptance of all the Minister's present proposals without modification.) But the operative part of the plebiscite is that addressed only to consultants and specialists, general practitioners, and doctors working whole-time at voluntary hospitals, who are asked to say first whether they favour accepting service under the Act in its present form, and secondly whether they will undertake not to enter the service if there is a sufficient majority against doing so. It is explained that they will not be called on to honour such an undertaking unless the majority includes at least 13,000 general practitioners; and, considering that there are only some 20,500 general practitioners in the country and that a proportion of these will not vote at all, the association has put its target fairly high—though certainly no higher than is necessary if it is to count on effective support. Given such support, it will advise members of the profession to continue their service to patients but not to enter into any contract under the Act.

A somewhat important question arises as to the circumstances in which services to patients would in fact be carried on. During the representative meeting it was emphasised that the National Health Insurance Act is not repealed by the National Health Service Act, and Dr. CHARLES HILL has said that N.H.I. will remain in operation until the appointed day even if Mr. BEVAN is obliged to postpone that day. Actually, as we understand the situation, N.H.I. is discontinued not when the National Health Service Act comes into force but when the National Insurance Act does so; and the appointed day for the National Insurance Act is also July 5. Even if Mr. BEVAN were to change his date for the National Health Service, continuation of National Health Insurance could be secured only by simultaneous deferment (or conceivably amendment) of the National Insurance Act—with all its promised attractions, including increased maternity benefits, better pensions for widows, the new funeral benefits, and the right to an augmented old-age pension which is to be given to people continuing in employment after pensionable age. Arrangements for introducing this insurance scheme have been going on in the new Ministry of National Insurance for the last eighteen months: the rates of contribution have been settled, and the contribution cards have been printed. To alter these arrangements and continue National Health Insurance would therefore be very difficult, even if Mr. JAMES GRIFFITHS could be persuaded of the wisdom or necessity of such a course.

At the Heels of the Common Cold

THE common-cold virus is being closely pursued by many workers. A few months ago POLLARD and CAPLOVITZ,[1] in Texas, reported the successful cultivation in fertile eggs of a virus obtained from nasal washings of patients with colds. Now DINGLE and his co-workers of the American Commission on Acute Respiratory Diseases [2] have transmitted infections to groups of volunteers, using filtrates of nose and throat washings from donors with four different types of illness. The first type was a severe febrile illness with sore throat and cough referred to as acute respiratory disease (A.R.D.). This seems to correspond to the "febrile catarrh" common among recruits in this country. Out of 14 volunteers receiving filtrates of A.R.D. washings, 12 developed an ailment similar to that of the donor but rather milder; sore throat and nasal obstruction, usually without coryza, were its most noteworthy manifestations, and its incubation period was 5 or 6 days. Filtrates from donors with the second type of illness, a febrile severe common cold (S.C.C.), produced in 9 of 14 subjects coryza with sneezing but usually without fever; the incubation period of this was only 24–48 hours. Material from an afebrile cold gave much the same picture after a similar incubation in 6 out of 10 volunteers. Finally, a patient with "bronchitis resembling atypical pneumonia" yielded material causing a minor respiratory illness but no pneumonia in 4 out of 10 subjects after incubation times of 2, 3, 3, and 7 days. Cross-immunity tests on volunteers recovering from these trials showed that A.R.D. convalescents were immune to A.R.D. but not to severe colds (S.C.C.). On the other hand, those recovered from the severe colds could be reinfected with the same material (stored in the ice-chest) after an interval of only 19 days. This short-lived immunity might well be borne in mind by those who hail each new alleged virus with the stereotyped comment: "The next step will be the preparation of a vaccine." Previous work [3] had shown that filtrates from patients with atypical pneumonia could produce in volunteers either atypical pneumonia or a mild disease resembling the common cold, the incubation period in either case being about 14 days. Now it was found that volun-

1. Pollard, M., Caplovitz, C. D. *Science*, 1947, **106**, 243; see *Lancet*, 1947, ii, 803.
2. Commission on Acute Respiratory Diseases. *J. clin. Invest.* 1947, **26**, 957 and 974.
3. Commission on Acute Respiratory Diseases. *Bull. Johns Hopk. Hosp.* 1946, **79**, 97.

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teers who had recovered from the A.R.D. and S.C.C. infections were not immune to the atypical-pneumonia agent. This work should help to differentiate at least three entities from the jumble of upper respiratory agents—atypical (or virus) pneumonia in its major and minor forms, A.R.D. or febrile catarrh, and at least one sort of common cold. The three infections seem to have quite different incubation periods.

The latest news from the National Institute of Health, Washington, is that TOPPING and ATLAS,[4] like POLLARD and CAPLOVITZ,[1] have cultivated a common-cold agent in the allantoic fluid of fertile eggs. Technical details are incomplete but it seems that a virus has been transmitted serially through seven passages in eggs. In some passage-lines the agent was lost, and inoculation of volunteers produced nothing; but if activity was present at all symptoms were produced in almost every inoculee—57 out of 60. This contrasts with the 50% or so of "takes" which most workers have obtained with uncultivated "cold" washings. The incubation period was 7–24 hours, whereas the washings from which the agent originated infected after an incubation of 36–48 hours. An incubation period as short as 24 hours has been reported by several groups of American workers on colds,[5] whereas the British team at Salisbury[6] finds the commonest period from infection to symptoms to be 2–3 days. The most important question arising from this Washington report is whether TOPPING and ATLAS are in fact dealing with the common-cold virus or with something else. The symptoms they describe include fever—up to 102°F in one subject—with headache, malaise out of proportion to the physical findings, postnasal discharge, unproductive cough, and nasal obstruction but *not* much serous discharge. In a press conference Dr. TOPPING is reported to have referred to "a thick severe form . . . something like what we know as sinusitis . . . not the runny-nose sort of cold." First impressions thus suggest that these workers have been studying a member of the respiratory-disease jumble, perhaps differing from any of DINGLE's three, but not what we think of over here as a common cold. So we must continue to watch expectantly and hope that one pack or the other will finally run the quarry to earth.

Chemotherapy of Throat Infections

ACUTE infections of the throat may be divided into four main categories—hæmolytic streptococcal tonsillitis or pharyngitis; a non-bacterial pharyngitis, usually exudative in character but without the typical inflammatory œdema or cervical adenitis of streptococcal infection[7]; faucial diphtheria; and Vincent's angina. The last of these, though difficult to define clinically, usually responds well to local penicillin therapy; but this treatment should not be continued beyond four or five days, because trauma from the hard pastilles or lozenges, plus infection with penicillin-resistant bacteria, may produce a secondary stomatitis. The non-bacterial pharyngitis, probably of virus origin, is not likely to respond to any antibiotic therapy. Both the hæmolytic streptococcus and the diphtheria bacillus, on the other hand, are susceptible to sulphonamides and to penicillin in the test-tube, and fresh evidence has lately been accumulated about the value of these drugs in the treatment of throat infections due to the two organisms. Any treatment of streptococcal tonsillitis or faucial diphtheria should have three objectives—clinical amelioration, prevention of complications, and rapid elimination of the infecting organism. The clinician may not be particularly concerned with bacteriological cure, but cross-infection and secondary complications in hospital can often be traced to the convalescent carrier, and early clearance of the reservoir of infection may therefore do much good to contacts if not to the patient himself.

In streptococcal tonsillitis, with which may be included scarlet fever, sulphonamides and penicillin have been used both locally and systemically. Local sulphonamide therapy has not been noticeably effective either in the acute case or in eliminating the organism from throat carriers. When systemic sulphonamide therapy is given early in the acute infection there may be some symptomatic improvement compared with untreated cases, but there is no shortening of the clinical course, no reduction in complications, and no rapid elimination of the infecting streptococcus from the throat, however sensitive it may be to the drug in vitro.[8] Local penicillin therapy with pastilles or sprays has given equivocal results, but intramuscular injections of penicillin given every three or four hours in a daily dosage of 100,000–200,000 units often produce symptomatic improvement and sometimes shorten the clinical course of the infection; they will also reduce the chances of secondary pyogenic infections though they will not prevent rheumatic fever. Elimination of the streptococcus from the throat seems to depend more on the duration of penicillin treatment than on the daily dosage. Thus in a U.S. Army trial[8] 20 patients given 200,000–400,000 units over a period of thirty-two to sixty-four hours were all throat carriers at eight to ten days, compared with 4 out of 13 patients (35%) who received 500,000–1,000,000 units over eighty hours and 78% of 244 untreated patients. The nasal-carrier rates at eight to ten days in these three groups—short course, long course, and controls—were 35%, 18%, and 32%; so even with the longer course the nasal-carrier rate is unsatisfactory. These American observers suggest[9] that where clinical relapses occur after penicillin treatment the patient may have failed to develop specific resistance because the streptococcus was eliminated early. In two comparative studies[10 11] of penicillin and antitoxin or convalescent serum in the treatment of scarlet fever, penicillin was found superior in preventing complications and reducing carrier-rates, though antitoxin lowered the temperature more rapidly. The understandable objection to repeated intramuscular injections continued for four or five days in an infection

4. Topping, N. H., Atlas, L. T. *Science*, 1947, **106**, 636.
5. Dochez, A. R., Shibley, G. S., Mills, K. C. *J. exp. Med.* 1930, **52**, 701. Long, P. H., Doull, J. A., Bonn, J. M., McComb, F. *Ibid*, 1931, **53**, 447.
6. Common Cold Research Unit. *Brit. med. J.* 1947, i, 650.
7. Commission on Acute Respiratory Diseases. *J. Amer. med. Ass.* 1947, **133**, 588.
8. Rantz, L. A., Spink, W. W., Boisvert, P. J. *Bull. U.S. Army med. Dept*, 1946, **5**, 662.
9. Spink, W. W., Rantz, L. A., Boisvert, P. J., Coggeshall, H. *Arch. intern. Med.* 1946, **77**, 260.
10. Hirsch, H. L., Rotman-Kavka, G., Dowling, H. F., Sweet, L. K. *J. Amer. med. Ass.* 1947, **133**, 657.
11. Hoyne, A. L., Brown, R. H. *Ibid*, p. 661.

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that is now remarkably mild may be met by giving the penicillin by mouth in 5–10 times the parenteral dosage. Oral penicillin is best given in two large doses, say of 500,000 units each, one half an hour before breakfast and the other about four hours after the last meal of the day, to ensure optimum absorption of the drug.[12] STEWART and MAY [13] give the penicillin in 4 oz. of 5–10% glucose solution containing gr. 20 of sodium bicarbonate. Alternatively, a large dose, such as 1,000,000 units, in aqueous or oily solution may be injected intramuscularly, and if necessary repeated next day, though there is as yet no convincing evidence that this will eliminate the streptococcus.

In the treatment of diphtheria, antitoxin must be given to counteract the damaging effects of the powerful toxin; and the substitution of a drug like penicillin can only be justified if the patient is allergic to foreign protein. Reporting a case of hypertoxic diphtheria which was mistaken for quinsy for four days and ended fatally despite 250,000 units of antitoxin, over 3,000,000 units of penicillin, and nearly 9,000,000 units of streptomycin, WALKER and colleagues [14] remark:

> "In the treatment of suspicious cases of severe pharyngitis with penicillin or streptomycin, one should not be lured into a false sense of security by the reported sensitivity of the Klebs-Löffler bacilli to these antibiotics. An early correct diagnosis in such cases with prompt administration of antitoxin is essential."

This is sound advice, but chemotherapy may be a useful adjunct to antitoxin for the rapid elimination of the organism and the prevention of a convalescent or chronic carrier state which often necessitates a long stay in hospital. Sulphonamides either locally or systemically do not seem to have been extensively tried for this purpose. Local applications of penicillin have been used in acute cases and in carriers with varying success. Reports of their value in convalescent carriers must be accepted with caution unless the trial is properly controlled with an untreated series, for many convalescent carriers become free of infection spontaneously. KARELITZ and colleagues [15] found in U.S. Army patients that hourly spraying (three-hourly during the night) of the throat with penicillin solution for a week did not eliminate the organism from 21 acute cases, whereas in 80 similar cases the intramuscular injection of 20,000 units two- or three-hourly until 3 consecutive daily negative swabs were obtained (total dosage 420,000–2,400,000 units) rapidly cleared the organism from the throat. Thus in five, ten, and fifteen days from onset the carrier-rates in the treated series were 27·5%, 7·5%, and less than 5%, compared with 83%, 65%, and 50% in HARTLEY and MARTIN'S original series treated with antitoxin.[16] WEINSTEIN,[17] with a dosage of 120,000–240,000 units a day, reported negative cultures in 17 out of 23 patients in four days or less. LONG [18] prefers an intensive short course of 500,000–1,000,000 units a day for three days. Besides the clinical response to this intensive therapy he found that in a small group of patients cultures from the throat were usually negative after the first or second day of treatment. WEINSTEIN found that chronic carriers responded less well than acute cases, and he suggested a maximum dosage of 240,000 units a day for twelve days for their treatment. Patients with large diseased tonsils harbouring diphtheria bacilli deep in the crypts may not respond even to very large doses of penicillin, and in such cases tonsillectomy offers the best hope. In nasal carriers of hæmolytic streptococci and *C. diphtheriæ* (the importance of nasal carriers in the dissemination of streptococcal infection has recently been emphasised by HAMBURGER and LEMON [19]), local sulphonamide applications or a sulphonamide-plus-penicillin snuff will often clear the infection. If not, a systemic course of penicillin, particularly for the streptococcal nasal carrier in whom the sinuses may also be affected, should be tried.

12. Markowitz, M., Kuttner, A. G. *J. Pediat.* 1947, **31**, 195.
13. Stewart, H. C., May, J. R. *Lancet*, 1947, ii, 857.
14. Walker, W. J., Massey, F. C., Mostofi, F. K. *J. Amer. med. Ass.* 1947, **135**, 771.
15. Karelitz, S., Wasserman, L. R., Moloshok, R. E. *J. Pediat.* 1947, **30**, 18.
16. Hartley, P., Martin, C. J. *Proc. R. Soc. Med.* 1919–20, **13**, 277.
17. Weinstein, L. *Amer. J. med. Sci.* 1947, **213**, 308.
18. Long, D. A. *Brit. med. J.* 1947, i, 884.

Annotations

PITUITARY EXTRACT IN PROLONGED LABOUR

BRITISH obstetricians have always looked askance at the exhibition of pituitary extract or 'Pitocin' before the birth of the baby, and there have been many reports of rupture of the uterus, birth-canal trauma, and intracranial damage to the fœtus for which pituitary extract has been blamed. Reid,[20] of Boston, and Eastman,[21] of Baltimore, plead for a review of this conservative attitude, and claim that the administration of pituitary extract to stimulate uterine contractions before the end of the second stage is justifiable in the right doses and the right cases. The doses should be small initially: Reid suggests min. 1, increasing by min. 1 every half-hour until the uterine contractions become satisfactory, dosage always being correlated with the response of the uterus. The total amount used in a labour in Reid's series averaged min. 5 and rarely exceeded min. 15; and the maximum dose given at one injection was min. 5.

The cases suitable for pituitary extract are those in which progress is slow, though disproportion and malpresentation have been carefully excluded. Every obstetrician knows the dangerous multipara—the woman who has borne several children without trouble, but who has increasingly big babies with each labour until relative disproportion exists. As the muscular tissue in the uterus of such a patient becomes progressively thinner, rupture becomes increasingly likely. It is therefore wise to confine the use of pituitary extract to an obstetrically normal primipara. With conservative treatment of primary inertia by sedation and attention to the fluid balance, the risks for the mother are distress, intrauterine sepsis, and the termination of labour by a difficult vaginal delivery—probably before the cervix is fully dilated. For the fœtus the danger is intrauterine asphyxia and intracranial hæmorrhage due to the trauma of delivery.

Reid's report is based on a review of 1609 patients, most of whom were under thirty and primigravid. At the onset of labour the head was usually in the midpelvis or lower. The length of labour was under twelve hours in 1155 cases, half of these being delivered in less than eight hours. The second stage of labour was one hour in 913 cases, and in only 229 was it over three hours. When pituitary extract was first given the cervix was

19. Hamburger, M. jun., Lemon, H. M. *J. Amer. med. Ass.* 1946, **130**, 836.
20. Reid, D. E. *Amer. J. Obstet. Gynec.* 1946, **52**, 719.
21. Eastman, N. J. *Ibid*, 1947, **53**, 432.

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at least half dilated in all but 101 cases, and in over half the cases it was fully dilated. To assess the fœtal-mortality rate of the series treated with pituitary extract, Reid took 11,506 normal deliveries, with a corrected fœtal mortality of 0·33%. This figure was reached by eliminating premature and immature infants under 5 lb., those with congenital defects, those with erythroblastosis, and the cases in whom no fœtal heart was heard on admission. Malpresentations were excluded, as were the accidents of labour such as prolapsed cord and separation of the placenta. Thus this figure of 0·33% represents the almost irreducible minimum fœtal mortality, and it can be looked upon as the inherent risk of being born.

In the 717 private cases and 636 hospital cases of prolonged labour treated with pituitary extract the corrected fœtal mortality was 0·69% and 0·63% respectively. This compares very favourably with the mortality-rate of 11·65% in the control group where pituitary extract was not used. Reid reports no instance of ruptured uterus or extensive birth-canal trauma in the pituitary-extract series; and the midforceps operation in the hospital patients was reduced to 0·5%. Eastman's findings are similar, though his dosage is more cautious than that of Reid: the initial dose is min. ½, and the individual dose never exceeds min. 1, with half-hour intervals between the doses.

These two papers must convince British obstetricians that the use of posterior-pituitary extract—preferably the pure oxytocin principle—is justifiable in the first and second stages of labour; but the indications for its employment must be very carefully observed, for there is no routine system or dosage.

METASTASES IN BRONCHIAL CARCINOMA

WITH the advent of radical surgery in the treatment of carcinoma of the bronchus, the recognition of distant metastases becomes more than a matter of academic interest. The presence of enlarged hilar or mediastinal glands can be inferred in many cases by radiography and bronchoscopy, but the routine clinical examination of any case of pulmonary carcinoma should include palpation of the liver and a careful study of the accessible gland regions, notably the axillary and supraclavicular groups, to exclude more remote dissemination. Bronchial carcinoma tends to produce bony metastases, which may easily escape notice unless they are looked for radiographically, for deposits in ribs are often unsuspected until the routine chest radiogram is examined. In this issue Colson and Willcox describe three examples of metastases occurring in phalanges and giving an initial clinical picture of inflammation resembling paronychia or whitlow. Radiography and aspiration biopsy confirmed that there were secondary deposits, and in one case necropsy showed multiple secondaries in most organs of the body. The joints of the fingers sometimes show arthritic changes in cases of bronchial carcinoma,[1] but there does not seem to be any connexion between these joint changes and the occurrence of phalangeal deposits. Possibly the joint changes, like the finger clubbing which is more commonly associated with bronchial carcinoma, are toxic effects resulting from the breakdown of growth within the lung. A common site for secondary deposits is the brain, and the clinical picture they produce may precede any symptoms or signs arising from the chest. In other cases cerebral secondaries are "silent" and may not be recognised in spite of careful investigation.[2] Similarly adrenal deposits may produce vague signs which can easily be attributed to the primary growth in the lung.

Hardly any organ is immune from secondary deposits in bronchial carcinoma, and it is perhaps remarkable that with the vast vascular field of the lung such deposits are not more frequent. Before surgery is embarked on it is essential to exclude as far as practicable metastases which have escaped the confines of the thorax.

1. Annotation, *Lancet*, 1947, i, 378.
2. Sellors, T. H. *Ibid*, 1947, ii, 119.

YEAR'S WORK OF THE EMERGENCY BED SERVICE

THE year 1947 saw a steady expansion in the work of the Emergency Bed Service in London, the total number of calls received being 13,453, an increase of 29% on 1946. Throughout the year the pressure on hospital accommodation was severe, but except during the last two weeks in March it was never necessary to turn away patients whose condition was really acute. In that fortnight, immediately after the end of the great frost, there was apparently a phenomenal increase in the number of people needing immediate admission to hospital and the hospitals were very full.

Following suggestions put forward in leading articles in the *Times* and the *Lancet* the E.B.S. became the channel for the admission of patients requiring streptomycin treatment. The service undertook to receive inquiries from doctors requiring this treatment for cases of tuberculous meningitis and miliary tuberculosis and to arrange admission at the hospitals to which are allocated the small supplies of the drug—first by the Medical Research Council and later by the Ministry of Health. Altogether 115 cases have been dealt with in this way and most of them have been admitted on the day of application. The remainder have had to wait for treatment and some have died while waiting; only an increase in the supplies of the drug from America can prevent this happening. It is encouraging to see, as announced in our news columns, that the hospital beds reserved for streptomycin treatment now number about 200.

During the poliomyelitis epidemic the service dealt with urgent calls for mechanical respirators. There are a considerable number of these machines about but no list of them was kept. The service compiled such a list and on 49 occasions in the year was able to arrange a loan from one hospital to another.

PRIMARY LESION IN PNEUMOCONIOSIS

THE respiratory disease commonly found in the coal-workers of South Wales is now acknowledged to be a pneumoconiosis, though ten years ago some authorities still strongly maintained that it was a bronchitis. This difference of opinion arose because few of the affected men were found to have the nodular silicotic type of fibrosis usual in metalliferous miners or others exposed to high concentrations of quartz. Pathologists have been accumulating conclusive evidence to show that although it differs profoundly from classical silicosis the coal-workers' disease is nevertheless due to dust and the lesions have their own distinctive characters. Accounts of the pathology have come from workers in the Welsh National School of Medicine. Cummins and Sladden[1] described the disease in various stages and concluded that the lesion was a combination of silicotic fibrosis and accumulation of coal dust. Gough[2] showed that the same type of disease occurs in Cardiff in trimmers who load coal into ships, and he established that the dust of commercial coal, with its comparatively low silica content, can be highly noxious. Badham and Taylor[3] described similar lesions in the coal-miners of Australia and referred to the characteristic lesion as the coal nodule; they also noted the association of emphysema with these lesions.

The dust lesions in coal-workers are on the whole much less fibrous than those of classical silicosis and

1. Cummins, S. L., Sladden, A. F. *J. Path. Bact.* 1930, **33**, 1095.
2. Gough, J. *Ibid*, 1940, **51**, 277.
3. Badham, C., Taylor, H. B. Studies in Industrial Hygiene, 1936, no. 19; 1939, no. 20. Extracts from *Annu. Rep. Dep. publ. Hlth, New South Wales.*

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Belt and Ferris [4] emphasised the presence of excessive reticulin. The lesions are disabling because they are associated with a characteristic form of emphysema which develops in and around the deposits of dust. Pathologists in Wales refer to this as "focal emphysema," and the term is now in common use by those dealing with pneumoconiosis. Lately Heppleston,[5] also working in the medical school at Cardiff, has examined the lungs of 85 Welsh coal-workers who had been exposed to dust for from one to sixty years. He has shown that the primary lesion of the pneumoconiosis is a focal accumulation of dust situated at the division of the primary bronchiole and this localisation is determined by the presence of lymphoid tissue at that point. In more advanced lesions a small amount of fibrosis develops and the characteristic emphysema forms in the adjacent vesicles. Heppleston concludes that the emphysema is mechanically produced, partly at least by the shrinking of the dust foci, and he believes that the lesions are largely determined by the mechanical accumulation of dust irrespective of its nature. He supports this conclusion by referring to the lungs of city dwellers in whom he has found lesions similar to those of the early stages of pneumoconiosis.

There is still uncertainty whether the disease in coal-workers is simply the result of overloading the lungs with inert dust or whether it is a modified silicosis, but the lesions are so different from those produced by high concentrations of quartz that the mechanism of their production may also be different. The change of outlook on the disease is reflected in the fact that in South Wales the terms coal nodule, coal foci, and focal emphysema are now commonplace while silicosis and silicotic nodulation are less often heard.

SMOKING AND THE HEART

Levy and his colleagues [6] in the U.S.A. have added some further items to the mass of data being accumulated concerning the effect of smoking on the heart. In 27 normal people and 21 patients with cardiac disease, with ages ranging from 16 to 71 years, they investigated the effect of smoking two cigarettes on the heart-rate, the blood-pressure, the electrocardiogram, and the cardiac output as measured by the damped ballistocardiograph. The average rise in systolic blood-pressure in the normal subjects was 13·4 mm. Hg (range of 2 to 32), compared with 17·6 mm. Hg (range of 6 to 34) in the cardiac patients. The comparable figures for the diastolic pressure were: normals 10 mm. Hg (range of 0 to 20); cardiac patients 11·8 mm. Hg (range of 4 to 22). The increase in heart-rate in the normal subjects averaged 8·5 beats per minute (range of −7 to +45), compared with 9·4 beats per minute for the cardiac patients (range of −6 to +39). The cardiac output in the normals fell by 1·8% (range of −20% to +17·1%), compared with an increase in the cardiac patients of 6·4% (range of −10·7% to +50·0%). No significant changes were noted in the electrocardiograms in any of the subjects tested. Judging by this investigation therefore, there is no significant difference in reaction to smoking between normal people and patients with heart disease. There was in fact a wider variation between individuals than between groups, and this personal variation was just as great among normal subjects as among the abnormal. It is noteworthy that, though 13 of the 21 cardiac patients had coronary disease, in no instance did smoking produce angina pectoris.

These findings should make the physician think twice before depriving his cardiac patients of a habit which may rank high among their remaining pleasures. Apart from the acuter forms of heart disease such as myocardial infarction, and peripheral vascular disease, where complete abstinence seems advisable, the patient with heart disease should take the same line as the normal person—if smoking upsets him he should give it up; otherwise he should follow the old dictum of moderation in all things. Perhaps one caveat should be added. Smoking, particularly of cigarettes, is liable to lead to coughing, and though the smokers' cough may be harmless to healthy people it puts a considerable strain on the damaged heart. So if the patient with heart disease finds that smoking makes him cough, he will be better without it.

4. Belt, T. H., Ferris, A. A. *Spec. Rep. Ser. med. Res. Coun., Lond.* 1942, no. 243.
5. Heppleston, A. G. *J. Path. Bact.* 1947, **59**, 453.
6. Levy, R. L., Mathers, J. A. L., Mueller, A. A., Nickerson, J. L. *J. Amer. med. Ass.* 1947, **135**, 417.

VIRUS PNEUMONIAS

IN the last eight or nine years a great deal has been written about the group of diseases usually termed "primary atypical pneumonia," but it is not yet possible to classify them all on a causal basis. In his review in this issue Dr. Scadding follows the lead of Topley and Wilson [1] in condemning the terms "atypical" and "primary atypical" pneumonia, which may convey the impression that the whole group have a common infective agent. Two subgroups—those including psittacosis and allied infections, and the rickettsial Q fever—have a defined ætiology; but in the remainder the cause is almost certainly various.

The careful studies of Dingle et al.[2] during the Camp Claiborne outbreak of 1944 established that the pneumonia was not caused by bacteria. Eaton and his co-workers [3] claimed that a virus, present in bacteria-free filtered washings from the upper respiratory tract of pneumonia-patients, and capable of producing a comparable condition in cotton-rats, is responsible for many human cases. The observation that the same, or a similar, virus exists naturally in cotton-rats led other workers [4] to minimise the importance of Eaton's work. They suggested that a streptococcus (MG or 344), possibly acting synergically with a virus, might cause the disease. This is unlikely, for the streptococcus MG is said to be penicillin-sensitive, and penicillin is useless in the treatment of these pneumonias; moreover, bacteria-free filtrates of washings from the respiratory tract of cases of the disease will produce comparable lesions in animals. According to Eaton, 60% of "atypical" pneumonias are caused by his "cotton-rat virus," less than 10% by the viruses of influenza, the psittacosis group, and other known viruses, and the remainder by causes unknown. Scadding points out, however, that the influenza viruses (A and B) are rarely the sole cause of pneumonia, though secondary invasion of the lung by common pathogens such as the pneumococcus and Pfeiffer's bacillus may be fairly frequent. Scadding's concept of a non-specific infected atelectasis complicating any sort of respiratory catarrh may explain some of the anomalous results obtained in attempts to transmit this disease to human volunteers. Such factors as individual susceptibility, the presence or absence of the virus in washings from the respiratory tract of cases of the disease, and even the technique of intranasal inoculation of the volunteers have also to be considered in assessing the significance of the conflicting results obtained, for example, by Vance et al.[5] and the U.S. Commission on Acute Respiratory Diseases.[6]

In diagnosis the demonstration of cold-agglutinins in the blood is suggestive but by no means a definite

1. Topley and Wilson's Principles of Bacteriology and Immunity. London, 1946; vol. II, p. 1876.
2. Dingle, J. H., Abernethy, T. J., Badger, G. F., Buddingh, G. J., Feller, A. E., Langmuir, A. D., Ruegsegger, J. M., Wood, W. B. *Amer. J. Hyg.* 1944, **39**, 67, 197, 269.
3. Eaton, M. D., Meiklejohn, G., van Herick, W. *J. exp. Med.* 1944, **79**, 649.
4. Thomas, L., Minick, G. S., Curnen, E. C., Ziegler, J. E., Horsfall, F. L. *J. clin. Invest.* 1945, **24**, 227.
5. Vance, D. H., Scott, T., Mason, H. C. *Science*, 1943, **98**, 412.
6. Commission on Acute Respiratory Diseases. *J. Amer. med. Ass.* 1945, **127**, 146.

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indication of virus pneumonia, since these agglutinins do not appear in every case and may occur in other conditions. The white-cell count is of greater value, for normal or only slightly abnormal total and differential counts are the usual finding, whereas a polymorph leucocytosis is usual in bacterial pneumonias. In the commonest type sparse physical signs are associated with widespread pulmonary lesions revealed radiographically. There is no specific treatment, but the prognosis is usually very good. Penicillin and the sulphonamides are useless, unless to combat secondary bacterial invasion—in fact, a belated retrospective diagnosis can sometimes be made on the failure of these substances to influence the course of the disease.

VISIBLE SPEECH

WE have already briefly noted a remarkable experiment by a team of workers in the Bell Telephone Laboratories in America.[1] By means of a cathode-ray device, speech is translated into luminous patterns, which move across a screen. The results were demonstrated, in 1946, at the annual convention of the American Association for Promoting the Teaching of Speech to the Deaf.

Debarred by deafness from ordinary use of the telephone, a member of the staff of the laboratories called up his wife at their home. Her speech, relayed to the audience by loudspeaker, was also converted into luminous patterns which were read by the deaf man, as from a book, while they travelled across the screen. Apart from a somewhat deliberate rate of speaking the conversation appeared to be normal. Later, two senior pupils of the Lexington School for the Deaf talked to each other by the same means from glass telephone-booths, in which they sat with their backs to each other, on opposite sides of the platform.

The method has been described[2] fully, but in non-technical terms, by Mr. R. K. Potter, director of transmission research at the laboratories, and Mr. G. A. Kopp and Mr. H. C. Green, former members of the technical staff. New but self-explanatory terms are used. For instance the "stop gap" due to the brief period of silence while the lips are closed during the first stage of saying the consonant "p" is followed by a "spike fill" recording the explosive and fricative puff of breath responsible for the characteristic sound. The picture produced by the consonant "b" has a "stop gap" but this is voiced and therefore not completely blank. The "spike fills" of "p" and "b" differ in detail from each other and from those of other stop consonants. The pictures are rich in information about the influence of one sound upon another, when combined in words and phrases. Just as handwriting is characteristic of individuals, so are these spectograms. However, the learner whose aim is to transfer his normal reading habits to the new method is enjoined to concentrate on essential features of pattern.

The spectograms will evidently serve to analyse many details of sound and speech. Some examples on which work has been begun are quoted: the heart beat, the speech of the deaf, speech defects associated with other abnormalities such as cleft palate, vocal and instrumental music, the songs of birds, and the sounds made by insects. Components of complex transient sounds can be made visible, and examples in colour delight the eye: here, perhaps, is a new way of apprehending music.

The equipment must be simplified and its cost reduced before it will be ready for duplication and general use. In its present form it offers a means of distant communication which may serve the deafened adult well. Learning to comprehend the spectogram must be, for the totally deaf, by means of lip-reading alone; those with some hearing will have the help of a hearing-aid. The relative difficulty of the two methods has not yet been assessed; and it is still too early to say whether the device can help the young deaf child who is wordless until he receives special education. Experiments at Ann Arbor, University of Michigan, should answer these and other questions. Meanwhile, it seems clear that we have here an exceedingly important device for the education of the deaf—perhaps as important as Braille has been for the blind—and one with potentialities still to be conceived and studied.

1. See *Lancet*, 1947, ii, 660.
2. Visible Speech. New York: D. Van Nostrand. London: Macmillan. 1947. Pp. 441. 25*s*.

THE PATIENT'S FOOD

IT seems that some of our hospitals remain deaf to complaints about their system of feeding patients. The fact that in the past relatives and friends augmented the hospital diet in many ways—a practice that should never have been necessary—is made an excuse for giving patients less than enough to eat; and this course is still persisted in when rationing prevents friends from making the time-honoured offerings of eggs, cake, jam, butter, and sugar. Most of these things hospitals could provide in abundance if they chose to take up their full allowance of rations. Yet even in hospitals which can boast of their good feeding, patients do not always get the butter and sugar to which they are entitled, and marmalade and jam are apparently served with a saltspoon.

Friends usually manage to make up some of these deficiencies; but how hard may be the plight of a patient with no friends at hand was demonstrated by Mrs. A. B. Munro in the *Nursing Mirror* of Dec. 6. Being separated from her relations by some hundreds of miles, she had nobody to bring her extras, and she was in hospital for three weeks. This hospital took her ration book and three weeks' points, and gave her the following diet:

7.30 A.M. *Breakfast:* On 5 days a week, two slices of bread and butter, and marmalade; two cups of tea. No more bread allowed. On 2 days a week a rasher of bacon and a piece of potato, or a kipper. 10.30 A.M. Coffee made with dried milk. 12 noon. *Dinner:* Meat and vegetables, and a pudding. A second helping of pudding was allowed. 3.30 P.M. *Tea:* The last official meal of the day. Two pieces of bread and butter, jam, and an extra cake or bun on Sundays. 7.30 P.M. Hot milk or cocoa, and one piece of bread and butter.

Everyone, she says, was ravenously hungry and wakeful by 4 A.M. She asked the matron whether she might be allowed to eat more at supper-time, but this was refused, on the ground that it was against the 20-year-old custom of the hospital. She was advised to get her friends to bring her eggs. She explained that this was impossible, and asked whether they might bring her fish instead. "Certainly not *fish*," said the matron: nurses could not be expected to cook fish.

On leaving, she discovered that patients in the paying wards of the same hospital had cereals and a cooked dish for breakfast, cake for tea every day, and a cooked supper with sugared coffee at 7.30 every evening. This, she feels, explains where some of her points and rations went. As a correspondent pointed out in our columns last week, the present food-supply difficulties are an insufficient excuse for poor feeding of patients. If some hospitals can manage well, others can usually do the same. Certainly there can be no possible justification for depriving any patient of his rations in order to increase those offered in the private wards.

Dr. DOUGLAS FIRTH, consulting physician to King's College Hospital, died in Cambridge, on Jan. 9, at the age of 67. Since his retirement in 1945 he had been organising postgraduate instruction in the eastern counties for demobilised medical officers.

Sir STEWART DUKE-ELDER has been appointed consulting ophthalmologist to London Transport.

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Special Articles

PLANNING THE PLEBISCITE

B.M.A. REPRESENTATIVE MEETING*

A SPECIAL representative meeting of the British Medical Association was held in London on Jan. 8, with Dr. J. B. MILLER in the chair, to consider the impending plebiscite of the medical profession.

Dr. GUY DAIN (chairman of council) found ready agreement for the council's suggestion that before the plebiscite the representative body should indicate the minimum majority justifying the association in recommending the profession not to accept service under the Act. The council, said Dr. DAIN, had decided that this prior decision was needed to avoid possible argument after the vote was taken; and the effect of this decision would be to make practitioners feel more secure in casting their votes.

The meeting considered drafts of the plebiscite form and the explanatory notes which are to accompany it. The plebiscite form is divided into three sections:

Section 1.—"I approve/disapprove of the N.H.S. Act, 1946, in its present form."

Section 2.—"I am in favour/I am not in favour of accepting service under the Act in its present form."

Section 3.—"I agree to abide by the decision of the majority and undertake not to enter the service if the answers to question 2 reveal a majority against undertaking service, as defined in paragraph 4 above, and if so advised by the British Medical Association."

Or: "I do not agree to abide by the decision of the majority if it is against accepting service as defined in paragraph 4 above."

In paragraph 4 of the explanatory notes, referred to in section 3, it is explained that if in the aggregate the votes of consultants and specialists (not holding whole-time salaried posts) and general practitioners show a majority against accepting service under the Act, and that majority includes approximately 13,000 general practitioners, the association will advise the profession not to enter into any contract under the Act in its present form but to continue their service to patients or other professional work. A later paragraph makes it clear that if these majorities are not achieved, practitioners will be released from undertakings to which they may have committed themselves under section 3 of the plebiscite form.

Section 1 is to be completed by all members of the profession. The council proposed that sections 2 and 3 should be completed by consultants or specialists not holding whole-time salaried posts, and by general practitioners; but Dr. DAIN acceded to the suggestion that these sections should be completed also by consultants or specialists holding whole-time salaried posts, and by practitioners engaged in whole-time voluntary-hospital work, including holders of B1, B2, and A appointments, and of class 1 and class 3 appointments under the Government's postgraduate scheme for ex-Service practitioners. The representatives discussed at some length extension of the vote under sections 2 and 3 to other clinicians; but they finally decided against further extension.

BASIS FOR ACTION

Dr. DAIN suggested that the Minister could not operate the new service with less than 8000 practitioners; and this had determined the choice of 13,000 (63%) as the minimum number of Noes needed for action to oppose the Act. He hoped, however, that a great many more than this would vote against participation, for the stronger the vote the easier would it be to organise further action.

In the discussion on the choice of those who should be invited to answer sections 2 and 3 of the plebiscite, Mr. A. S. GOUGH (council) said: "We simply want to know the effective vote of those who will work the Act from July 5." Dr. J. B. W. ROWE (Harrow) quoted the instance of one large hospital where all of 14 housemen were reported to have swallowed the Minister's statement. Housemen, he added, were young, tending to hold idealistic opinions, and they might thus tend to vote for acceptance. Mr. C. F. MAYNE (Plymouth) thought that "as a representative body which tends to be middle-aged, we must remember the young men and women" by whom the future of the profession would be largely determined.

Dr. CHARLES HILL, secretary of the association, said that the purpose of sections 2 and 3 of the plebiscite was to establish the number who would say "Yes" when confronted with the issue of joining the service or not. He estimated the number of doctors in whole-time voluntary-hospital appointments, excluding those of specialist status but including those holding B1, B2, and A appointments, and class 1 and class 3 appointments, as follows: England and Wales, 4750; Scotland 650.

THE GENERAL-PRACTITIONER VOTE

Dr. C. V. BROWN (Manchester) held that the required proportion of general practitioners should be raised.

Dr. J. C. ARTHUR (Gateshead) asked that the figure should not be fixed too high. With the absolute minimum the Minister might bring in some sort of service; but this the Government would refuse to sponsor because of the inconvenience it would cause to the public.

Dr. W. N. LEAK, claiming that doctors would have no security under the Act, believed that they should at the time of the plebiscite give the association authority to hand in their resignations from the National Health Insurance scheme, for which three months' notice was required. Dr. F. GRAY (council) considered that raising the percentage would amount to an admission of fear.

ALLAYING FEARS

"This," said Dr. DAIN, "is the time of action. Even if we got 75% and then did nothing up to July 5, we should be lost." After the plebiscite it would remain for the position to be explained to doctors so that they did not enter the service; no less important than the vote itself would be action to solidify the vote. It was not possible, as had been suggested, to send out for completion legally binding forms when the plebiscite papers were distributed. "We should discharge our minds of fears." If 13,000 practitioners abstained from service, the association would be in a strong enough position. Failure could come only through fear. The consultant or specialist might say "Yes" through fear of losing his hospital contract and thus his practice. Fortunately, no contracts would be ready by July 5; it would be in order for specialists to continue their hospital work till contracts were prepared, and by then, he believed, the operative date would have been postponed. Some general practitioners hesitated for financial reasons; but if the profession stood together there would be no new service, and the National Health Insurance Act would remain effective until the new Act was amended.

The meeting agreed that the percentage should remain at 63; but, to clarify the issue, it voted that in the explanatory notes this percentage should be referred to in terms of the absolute number—13,000 (out of a present total general-practitioner strength of 20,500).

GUIDING THE PROFESSION

Dr. HILL explained that two documents setting out the situation were shortly to be issued to the profession; and representatives heartily commended a Bromley

* As this meeting was regarded as primarily domestic, representatives of the lay press were not invited to attend. For the same reason our own report has been abridged.—ED. L.

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proposal that with these should go a statement indicating that "in their considered opinion the National Health Service Act, 1946, in its present form is so grossly at variance with the essential principles of our Profession that it should be rejected absolutely by all Practitioners."

Dr. R. HALE-WHITE (Marylebone) asked that the council, shortly before the plebiscite, should give the strongest possible lead to the profession not to accept service under the Act. This motion was carried.

Dr. ARTHUR urged immediate consideration of steps to be taken to continue medical services if service under the Act should be refused. In reply, Dr. DAIN said that either the fight would be off or things would continue as they are. He admitted that for three months—which was as long as the contest was likely to last—practitioners would earn less money.

Another speaker referred to the "ignorance and apathy" among patients. The time had come to make the public realise fully what the profession felt. Moreover, several papers were hostile. The public should be left in no doubt that the action proposed by the association was in their own interest as well as in that of doctors. Dr. ARTHUR's motion was accepted.

VICTIMISATION

Mr. E. H. RICHARDS (North Staffordshire) moved that the council should insist that any final settlement should include a non-victimisation clause. Residents, he said, feared that by voting No they might for ever be deprived of appointments at the hospital of their choice; but with assurance that they would not be victimised, 100% of resident staffs would vote No. Dr. R. KELSON FORD (Chelsea and Fulham) emphasised the importance of residents completing their tenure. If they did not do so, what of the patients? Continuity of office was essential.

Dr. DAIN assured the meeting that if and when the association came to any agreement with the Government, it would insist on there being no victimisation. A previous speaker had referred to fears of financial loss through voting No. The association had, however, very substantial funds from which to meet this contingency, and if the profession stood properly together hardship would be minimised. Mr. RICHARDS's motion was carried.

Speaking to a further motion, Dr. DAIN announced that the council's executive committee would shortly decide how doctors might remain out of the service without fear of being let down by any colleagues who entered the service.

CONSERVATIVE SURGERY IN ALEPPO

IN Moslem countries, where death is often preferred to the loss of a limb, conservative surgery acquires an importance that is lacking elsewhere. Amputations must be avoided at almost all costs. In fact, Dr. A. S. Altounyan told the International Congress of Surgery, which he attended last summer, that when he first set up practice at Aleppo sixty-five years ago his patients were extremely reluctant to submit to surgery of any kind, not through lack of courage but through their fatalistic attitude. Surgery seemed to them to be an attempt to interfere with the will of God.

Some twenty years later Dr. Altounyan had so far gained the confidence of his patients, by performing a series of 150 operations on internal organs without a single fatality, that he was able to build a hospital, where more than 28,000 conservative operations have been performed on limbs which in any other country would have been amputated. Some extraordinary results have been achieved in this way, of which the following are typical examples:

Case 1.—In 1897 a girl, aged 15, with multiple tuberculous sinuses of right scapula, shoulder-joint, and upper humerus, for which amputation had been advised by an American professor at Beirut, came for treatment by conservative measures. In a series of six or seven operations spread over two years all the diseased bone was successfully dissected away without damage to any important nerve, blood-vessel, or muscle.

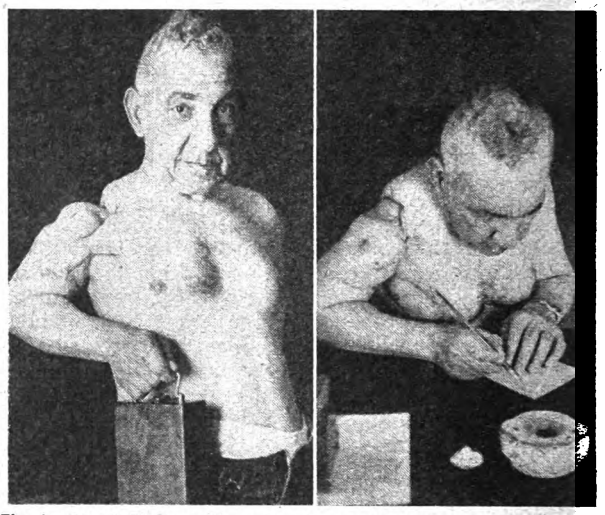

Fig. 1—Case 3, 53 years after extensive removal of necrotic bone around shoulder-joint.

Today, at the age of 65, the patient works hard to support her family and plays her guitar at wedding ceremonies.

Case 2.—In 1890 a young man, aged 19, was seen with suppurative synovitis of the right knee-joint and caries of the articular surfaces. After preliminary cleansing and injection and aspiration of antiseptic fluids, five operations were performed over a period of more than a year, the necrosed tissue being scraped away and the articular surfaces excised. The result was at first unsatisfactory, but later more diseased bone was removed from both femur and tibia to expose healthy bone, after which the two bones were brought into close apposition.

The final result was a perfect union, with 3 in. of shortening. The patient, now aged 76, tends his cows and delivers their milk on foot.

Case 3.—In 1892 a boy, aged 16, reported with dislocation of the right shoulder sustained by falling out of bed a year earlier. Besides the dislocation there was extensive caries of the head of the humerus, the head of the scapula, and the outer end of the clavicle. Six operations were performed in about two years, all necrosed bone in scapula, clavicle, and humerus being dissected away, with a satisfactory result.

This patient is now a prosperous business man of 71, and can use his right arm to carry weights and write letters (fig. 1).

Fig. 2 shows a woman who had a similar series of conservative operations on her right elbow.

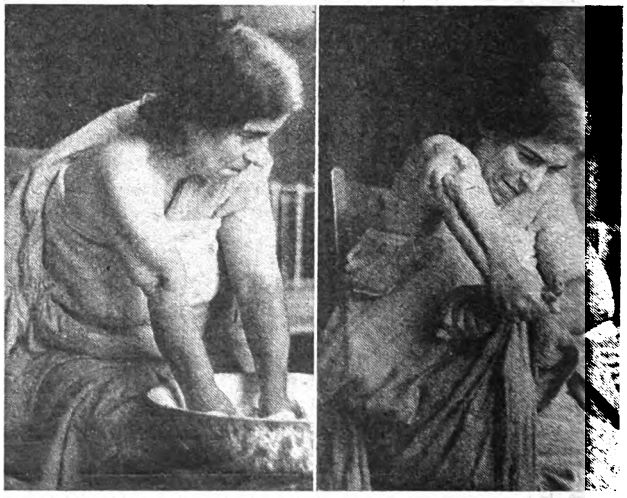

Fig. 2—Washing and wringing clothes many years after removal of necrotic bone around the elbow.

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Modern Hospitals

III

KARLSKOGA HOSPITAL, SWEDEN

STIG LINDGREN
M.D.
CHIEF SURGEON

SWEDEN has about twenty county councils, each of which is responsible for the medical services in its area. The councils supply funds from the rates for the building of hospitals, and contribute to the cost of their operation, which is not nearly covered by the fees charged to patients.

The Karlskoga county council hospital is smaller than that at the county capital, which includes many special departments, and is representative of medium-sized

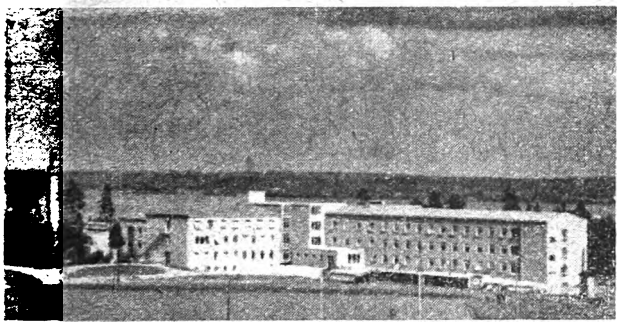

Fig. 1—General view of the hospital.

Swedish hospitals. Karlskoga is an industrial town of 30,000 inhabitants, and, with the surrounding country, the hospital serves about 60,000 people. It was built in two stages. The surgical department and the maternity and outpatient clinics were completed in 1942, while the medical department has only lately been opened.

The hospital (fig. 1) is on a hill, 2 kilometres from the centre of the town, on a site of about 20 acres. It contains 241 beds—102 medical, 102 surgical, 19 maternity, and 18 E.N.T. Besides the hospital itself there are seven houses for nurses and doctors, housing about three-quarters of the staff; the remaining quarter live in the town. The only rooms for staff in the hospital itself are those for the nurses and doctors on duty.

The hospital is built in five wings (fig. 2). Because of their particular requirements in size and shape the special departments are in a separate building. Each wing has only three floors and a basement; and intercommunication is mainly horizontal.

Entry is by a main hall—a single-story building in the centre of the hospital. Here are cloakrooms, a kiosk for the sale of papers, confectionery, and flowers, and the telephone exchange, the operator of which also answers inquiries. Near this central hall are the administrative offices and visitors' lavatories.

MEDICAL AND SURGICAL WARDS

The three medical ward units occupy one wing and the three surgical wards another. A central corridor in each unit (fig. 3) divides the patients' rooms, facing south-east, on the one side from the other side on which are placed the administrative, duty, and treatment rooms, and scullery, lavatories, tea-kitchen, and store-rooms. On this side also are four single-bedded isolation rooms for seriously ill, newly operated, noisy, or infectious patients. This fairly generous provision of single rooms makes the larger wards more attractive, since they contain only patients who are comparatively well. The general wards, 16½ ft. long, accommodate 3 beds in a row (fig. 4); in each unit three rooms, measuring 16½ by 13 ft., take 3 patients, and three more, measuring 16½ by 23 ft., take 6 patients. Cubicles for children are incorporated in two of the rooms; and there is one single-bedded and one 2-bedded private room.

The daytime staff in each ward consists of six nurses (two sisters and four probationers); at night there is one sister and one nurse, the former supervising three wards. Nurses work a week of 48–50 hours; mobile reliefs take charge during off-duty times. The wards can be operated with these small numbers because of labour-saving devices and the practice of getting patients out of bed at an early stage and letting them attend to themselves.

SURGICAL AND MATERNITY DEPARTMENTS

The third wing is mainly surgical. On the ground floor is the outpatient department (fig. 5), consisting of waiting-hall, two theatres for minor operations and accident cases, examination rooms, darkroom, and the surgeon's private consulting-room. Surgical outpatients come in through the main entrance, where they leave their coats, and go to the waiting-room. There is a separate direct entry to the outpatient department for emergency cases; this is kept open at night when the main entrance is shut.

Surgeons at a county hospital may engage in private practice at the hospital, charging fees by a fixed scale. Under this system the hospital gains by having its doctors always on the premises. The surgeon pays the hospital a fee for the use of equipment; and the house-surgeons share in the practice. The senior surgeon holds private consultations on four days a week, from 1 P.M. to 5 P.M., appointments being made by telephone.

Acute cases are of course admitted at any time; they are attended by the house-surgeon on duty, the senior surgeon being called only in exceptional cases. House-surgeons also take charge of cases returning for follow-up, and of others who do not attend practitioners in the town. In 1946 there were 5000 new surgical patients, who accounted for 12,000 attendances.

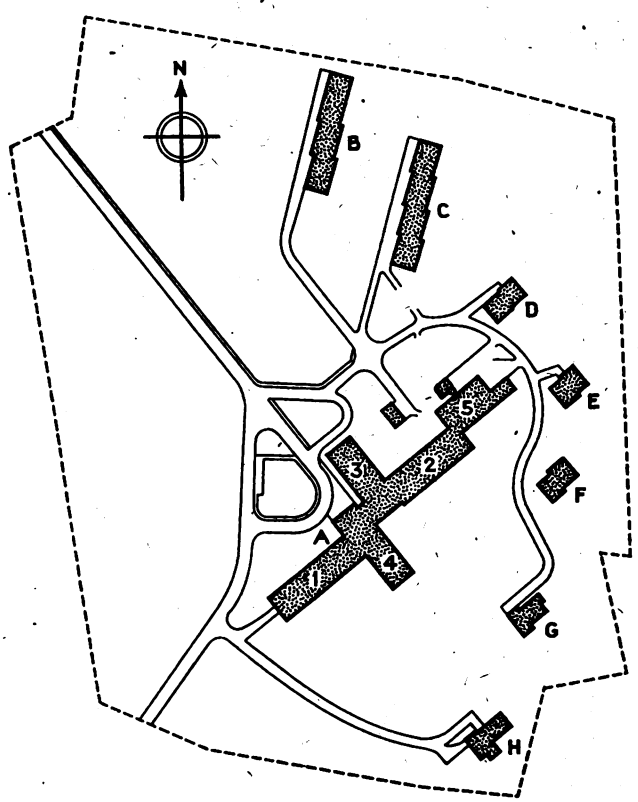

Fig. 2—Ground-plan of the hospital: (A) entrance and main hall; (B–H) houses for the staff; (1, 2) wards; (3) surgical and maternity departments; (4) internal-medicine, ear, nose, and throat, pathology, and X-ray departments; (5) kitchen, restaurants, club-room.

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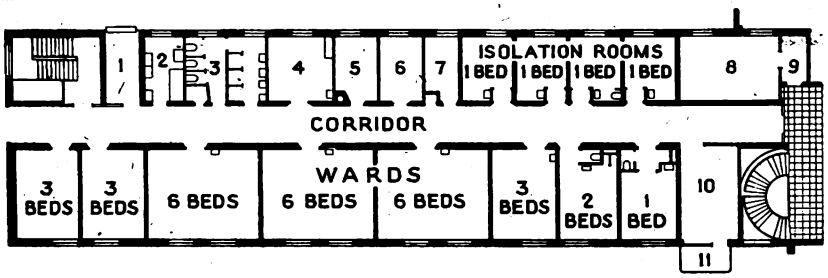

Fig. 3—A ward unit: (1) airing balcony; (2) store; (3) bath- and wash-rooms; (4) treatment room; (5) sluice; (6) kitchen; (7) store; (8) film-examination room and (9) writing-room (not part of the ward unit); (10) dayroom; (11) balcony.

On the first floor of this wing is the operating department, consisting of two theatres for major operations, a further theatre for cystoscopies and gynæcological examinations, and two preparation rooms, one of which is used also for plaster work. The surgeons have a dressing-room, a bathroom, and a small library. There is also a nurses' duty-room and a large sterilising-room serving the whole hospital. The nursing staff consists of two theatre sisters, one nurse, and three probationers who are on duty every other day. In 1946, 1600 operations were performed.

Fig. 4—One of the wards.

The hospital office is on the same floor; this employs three shorthand typists who type all case-histories. Dictaphones are largely used by the doctors for dictating case-notes.

On the second floor of this wing is the maternity department, which comes under the surgical division. This consists of a labour ward, with 2 labour-beds, one infants' ward, and 19 maternity beds. The staff numbers ten—three midwives and seven assistants. In 1946, 790 women were confined here. Forceps cases are delivered in the labour ward, but cæsarean sections are done in the surgical theatre.

MEDICAL OUTPATIENTS AND SPECIAL DEPARTMENTS

The fourth wing contains on the ground floor the medical outpatients department. The senior physician, like the surgeon, is entitled to engage in private practice at the hospital. Besides a waiting-room there is a consulting-room for the senior physician, three examination rooms, of which one is equipped with X-ray apparatus, and nurses' and house-physicians' rooms. The department employs two nurses and two probationers.

The hospital laboratory, on the same floor, is divided into four rooms and into store-rooms. It is staffed by two nurses, two probationers, and a supervising pathologist from the chief county hospital who visits every fortnight.

On the first floor is the X-ray department, which is equipped for both diagnosis and therapy. It is run by one senior and one junior radiologist, three nurses, and four probationers. About 8000 diagnostic examinations are made annually.

The second floor houses the 18-bedded ear, nose, and throat department. There are seven wards, each taking only 2 patients, and four cubicles for children. An oto-laryngologist is in charge; unlike other members of the staff he does not undertake private practice in the hospital. There is a large operating-theatre, with adjoining sterilising-room, for minor operations such as tonsillectomies and paracenteses. Major special operations are done in the surgical department.

The basement of the fifth wing contains the central-heating and refrigeration plants. On the ground floor are the central kitchen and a restaurant, which is used by many of the staff. Meals are served between 8 and 9 A.M., 12 noon and 1 P.M., and 5 and 6 P.M. On the first floor are social and club rooms—two for nurses and probationers (fig. 6), and one, containing the hospital's medical library, for the medical staff. In the basements of the other wings are the various stores, remedial baths, the physiotherapy department, dispensary, and laundry. Most of the laundry, however, is sent out to the central county laundry.

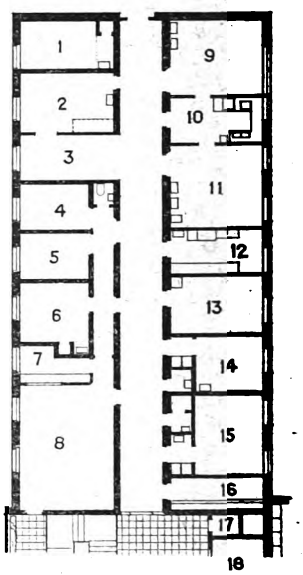

Fig. 5—Surgical outpatients department: (1) seriously ill patients; (2) darkroom; (3) waiting-room; (4, 5) examination rooms; (6) chief-surgeon's room; (7) nurse's room; (8) waiting-room; (9) theatre; (10) sterilising-room; (11) treatment room; (12) duty-room; (13) gynæcology; (14, 15) house-surgeons; (16) store; (17) telephone; (18) lift.

ADMINISTRATION

A patient seeking attention for a subacute or chronic condition can attend the outpatient department or see his private doctor who may refer him to the hospital. His name is then put on the waiting-list, and he is seen in his turn; the waiting period for non-acute cases averages 2–4 weeks.

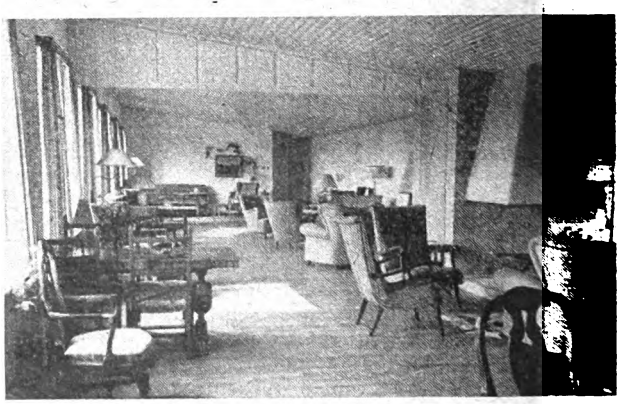

Fig. 6—Nurses' club-room.

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In order to reduce this interval every effort is made to expedite diagnosis and treatment; and the average stay in the surgical department has been reduced to 11·3 days.

Inpatients are charged 3 kr. (equivalent to 3*s.* 6*d.* in normal times) a day. The present average cost to the hospital of each patient is 17 kr. (19*s.* 2*d.*) a day; and on average each patient costs the hospital 180 kr. (£10). The difference is made up by the county council. If the patient belongs to an insurance society—and three-quarters of them do—then the society pays and the patient has no direct expenses. For those who can pay a higher rate private or shared rooms may be had at 15 kr. (16*s.* 6*d.*) and 7 kr. (8*s.* 9*d.*) a day.

The whole staff numbers 163; it includes 4 surgeons, 4 physicians, 2 radiologists, an E.N.T. surgeon, a consulting pathologist, and some students. Sisters and nurses total 40. The administrative staff consists of a non-medical superintendent and 2 assistants. One of the medical staff is on the committee representing the hospital on the county council. The staff receive their salaries from the county council in full, and they pay for lodging in the hospital and for food in the restaurant.

Public Health

Detection of Venereal Disease

REGULATION 33B was introdueed in 1943 to bring under medical control patients with venereal infection who were unresponsive to educational and persuasive methods. A Ministry of Health circular (5/48), announcing the expiry of this regulation on Dec. 31 last, suggests that a patient under treatment, when asked to induoe a contact to attend the clinic, should be given a slip or card bearing his clinic number and the code designation of his disease; the patient should be asked to pass this on to the contact with the request that the contact, if attending the clinic, shall present it.

There is, says the circular, nothing to prevent a medical officer at a venereal-disease clinic asking patients under treatment about the suspected source of infection, provided that it is made clear to patients that they need not give this information if they do not wish to do so. If the information is given, the patient should be asked if he or she agrees to its being used for the purpose of approaching the person named as a contact; and it should be explained that the source of the information will not be disclosed to that person without the consent of the informant.

Infectious Disease

POLIOMYELITIS AND POLIOENCEPHALITIS

England and Wales.—In the week ended Jan. 3 notifications of poliomyelitis rose slightly—59 (44)—while those of polioencephalitis were the same—4 (4). Figures for the previous week are shown in parentheses. The Christmas holiday may have led to some delay in notification and the slight rise may be more apparent than real.

Scotland.—According to a Health Department survey, the number of suspected and confirmed cases intimated by medical officers of health between June 1 and the end of last year was about 1675. Among 865 cases notified in the sixteen principal towns, there were 69 deaths. The chief medical officer observes that "the fact that the 1947 outbreak had an age incidence which, while still predominantly in children, showed a marked shift to older ages . . . is a pointer to the distinct possibility that the causative virus may have been of a new nature to the population at risk." In this outbreak, he adds, "there were features which lent support to the theory that the causative agent was mainly transmitted by aerial spread from the upper respiratory tract rather than by infectious bowel discharges."

PARATYPHOID FEVER

In the week ended Jan. 3, 14 cases of paratyphoid fever were notified at Ipswich, and 12 cases were reported elsewhere in Suffolk.

In England Now

A Running Commentary by Peripatetic Correspondents

IT all started at one of those after-dinner gossiping parties that to me are much the best part of any meeting of orthopods. On this occasion there were about half a dozen of us, and the conversation meandered pleasantly over such topics as congenital dislocation of the hip, Lancashire comedians (with the professor giving a life size imitation of Robb Wilton), Socialism in our time, hallux valgus, and the Chartist movement. In this way we came naturally and easily to music, and it was then that the professor put the idea into my head.

He'd been saying, in effect, that great music should never be heard for the first time because it can't really be appreciated until one is tolerably familiar with the score. My grouse was that whenever I developed a vague liking for something or other and would like to get to know it, every orchestra in the country decided not to play it again for two years and the B.B.C. arranged not to broadcast it except in the middle of outpatients. "Then why depend on them," said the professor, "why not learn to read a score?" The professor, of course, had been reading full orchestral scores since he was eighteen, just as you and I read a newspaper. "After all," he continued, "it's only a matter of being able to read horizontally and vertically at the same time, and it'll be good for your surgery too—it'll make you think in depth."

I started with one or two things I knew pretty well, like the Grieg Piano Concerto, and to my delight and astonishment I found that with a little practice I could actually hear the music in my head. All that stuff I learned so painstakingly about visual tracts and auditory tracts must be so much nonsense, for here I was looking at a lot of dots on a piece of paper and hearing a magnificent concerto—played, mark you, as never before. I began to feel less and less sorry for poor old Beethoven, who was stone deaf after the Fifth Symphony, and who, I always used to think, had been singularly ill-advised to get himself born before the ear people invented their new-fangled fenestration operation. To make matters worse—or better, whichever way you look at it—I went to a Halle concert not long afterwards at which they were playing Debussy's "La Mer." I half closed my eyes in the part where it gets a bit of a swell on and the visual impression was so strong that I felt positively seasick. Some time afterwards I saw a young woman actually being sick at a Beecham concert, but it was in the middle of a Haydn symphony, so I assumed it must be something she'd eaten. However, it's very disturbing to have one's visual and auditory tracts playing musical chairs like this after forty odd years of the strictest anatomical rectitude.

The next time I bumped into the professor he asked me how I was getting along. I told him that while I had increased my repertoire considerably (I now had about a dozen scores) I was having some difficulty with my ensemble—the 'cellos would keep coming in late and the woodwind were never quite together. "Then you should try conducting them," he said, and that started the whole dangerous business. It certainly worked as far as the ensemble was concerned, but, after all, you must have real people even in an imaginary orchestra. I started off with Laurance Turner and Co., but they didn't take to me very kindly after John Barbirolli, so in the end it just had to be the B.O.A. Symphony Orchestra. I wish I dare tell you how I selected my trumpet players, what I did with the V.I.P.'s, whom I chose for my leader, and how I dealt with George—but that's another story and the Editor wouldn't print it anyway.

* * *

It was the night before Membership (the examination paper, unfortunately, not the act), and I prayed for a good night's sleep. My prayer was heeded until about three o'clock, when I woke in a restless confusion, "anxious, hungry, with an epigastric void, sweaty, clammy skin, and a fine tremor of the hands." Was it a dream that was responsible for the hypoglycæmia, or did the hypoglycæmia induce the dream?

The day of the path. viva had arrived, and three of us found ourselves facing that awe-inspiring master-physician, Dr. Ronald Seeker. My fellow-candidates

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having been directed to a row of "pots" at the other end of the room, the Mind led me over to a double-topped table, between the layers of which I could see an assortment of about fifteen pieces of cheese. Some were small, some large, some complete, some crumbly, but all were very very old and stale, with that semi-translucency showing through the dust that one might term the patina of age. The Mind searched among them and with a grunt of satisfaction pulled out a decrepid rocky lump, placed it in my trembling hands, and asked, with the sinister cynicism of Alastair Sim, "What . . . do you think . . . of that?" For a silent minute I handled the object. I inspected, palpated, and very nearly percussed it. With sudden hope I discovered a small sandwich-flag label stuck in the back, but its faded writing only read "Sugar-water cheese." At last, like a boy in a breath-holding competition, I was unable to contain myself any longer and blurted out, "I really don't know, Sir." To my great surprise and greater relief a soft smile suffused the face of Dr. Seeker. "That's all right," he said, "you needn't worry. This is a collection of cheeses presented to the College by Napoleon Bonaparte, and, frankly, we loathe the sight of them."

Sugar-water cheese!—just the thing, I'm sure, for hypoglycæmia, but I had none, curiously enough, at my bedside, and I heard Big Ben strike three, four, five, six, and seven. I'm afraid it will be at least another three months before I have the opportunity of displaying my ignorance of the medical aspect of cheeses to the Great Man himself. Afraid? Perhaps I'm glad.

* * *

The advent of potato rationing was followed by a benevolent Ministry's announcement that potatoes should be cooked in their skins. I can hear my late Flight-Sergeant Admin. saying that he couldn't agree less. I imagine myself back in uniform addressing a lecture-room full of Service cooks. "See," I say, suiting action to words, "see what a wastage of vitamin and solid food falls away into the swill bin. Why should we feed the fat station pig on food destined for our own bodies? Cook them in their skins! We gain calories, save man-power, save vitamins, and increase production. In my hand I hold a ravished tuber. On the floor are peelings, the garlands from her brow. This should be a lesson to all of you! Parade . . . disssmiss!" The cooks seem rather dismal as they file out. I turn to the Flight-Sergeant with a raised eyebrow. "Good speech, Sir," he says gloomily, "but gor blimey, Sir, bang goes our flipping spud fatigue."

* * *

I was pleased to find I had correctly guessed the native place of one of my patients today by the tone of voice in which he said "Ah" when I was looking at his tonsils.

* * *

Cautionary Tale.—Once upon a time there was a great philanthropist, Alfred Nobel, who invented dynamite, and explosive so terrifying in its potentialities that he hesitated to publish his findings lest someone misuse them. When he eventually did so he took the precaution of stating clearly that it had the power of destroying men by the score. He hoped that the war-mongers of that era would be so appalled by the possibilities of such a weapon that war might for ever be banished from the earth.

A group of investigators in America have spent a great deal of time and trouble in delving into the problems of bacterial warfare. They have published their results in an erudite paper in which they even discuss what research will be necessary to render easier the task of destruction by this means. The object of publishing the paper was, apparently, to present all the available facts so that the war-mongers would be so appalled by the possibilities of such a weapon that they would not dare to use it.

* * *

Text for Mr. Bevan: "There is that scattereth, and yet increaseth: and there is that withholdeth more than is meet, but it tendeth to poverty."—*Proverbs*, XI, 24.

Letters to the Editor

ANKYLOSING SPONDYLITIS

SIR,—The belief that ankylosing spondylitis and rheumatoid arthritis are one and the same disease has been reaffirmed by Dr. Lennon and Dr. Chalmers (Jan. 3).

Especially in American literature, one reads of "rheumatoid arthritis of the spine" or "rheumatoid spondylitis" as a synonym for this disease. The evidence against this view is weighty. Thus ankylosing spondylitis occurs ten times oftener in males than females. Rheumatoid arthritis affects females at least five times oftener than males. In my series of 692 rheumatoid arthritics and 36 cases of ankylosing spondylitis, I find that the former consisted of 574 females and 118 males, whilst the latter comprised 3 females and 33 males.

The effect of treatment again suggests a different ætiology. Over 80% of rheumatoids derive striking objective benefit from chrysotherapy; spondylitis is unaffected.

Finally the characteristic bone change in rheumatoid arthritis is that of decalcification; that of spondylitis is ligamentous calcification following upon inflammation of the joints. It is true that a small proportion of the latter patients develop small-joint inflammation, but that is no justification for regarding the case as one of rheumatoid arthritis.

Lennon and Chalmers write that they have many cases of long-standing rheumatoid arthritis with typical "bamboo spines" and sacro-iliac destruction, and imply that the picture is that of ankylosing spondylitis. This is a startling statement. In my 692 rheumatoids there has been no instance of this. Of course, one is familiar with the decalcification of the spine, the deformities from long recumbency, the secondary osteo-arthritis, and the destruction of joint cartilage which may arise in chronic and severe rheumatoid arthritis. This is not, however, ankylosing spondylitis.

London, W.1. A. H. DOUTHWAITE.

VITAMIN E IN ANGINA PECTORIS

SIR,—Several reports have recently appeared from Vogelsang, Shute, and Shute [1] concerning the use of vitamin E in heart disease. One report analysed the results of this treatment in angina pectoris. Each of 84 consecutive unselected cases of heart disease, manifesting anginal pain as one of the major symptoms, was treated with 200–400 mg. of vitamin E (alpha-tocopherol). Complete relief from pain was recorded in 6, marked improvement in 38, some improvement in 37, and no improvement in 2; there was 1 death.

Since the response of angina pectoris to treatment is difficult to assess owing to the natural variation in the severity of the pain and the frequent suggestibility of these patients, it was decided to treat a small series of cases to see if the results of these authors could be repeated. The treatment was applied to 6 men and 4 women with moderate or severe angina pectoris; the Wassermann reaction was negative in 9 cases and positive in 1. Hypertension (blood-pressure over 160 mm. Hg systolic or 100 mm. diastolic) was present in 5 patients, while 4 gave a history of a previous coronary thrombosis.

'Ephynal' (Roche) was used; 300 mg. was given daily for six weeks, and for longer if any improvement took place. In 6 cases there was no improvement at all; in 1 case there was marked, in 1 moderate, and in 2 slight and somewhat indefinite improvement. Patients showing any improvement were for varying periods put on inert tablets resembling vitamin E, for control purposes.

In a most careful investigation of different drugs used in the treatment of angina pectoris, Evans and Hoyle [2] showed that a measure of improvement appeared to result from nearly every remedy, and at least as great an improvement was reported during treatment with a placebo, with which 40% of patients found that pain was diminished. Thus, in order to show that a drug is of specific value in the treatment of angina pectoris, it would appear that favourable results

1. Vogelsang, A., Shute, E. V., Shute, W. E. *Med. Rec.* 1947, 160, 21, 163, 230, 279.
2. Evans, W., Hoyle, C. *Quart. J. Med.* 1933, 2, 311.

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should be obtained in more than 40% of cases, since otherwise any improvement could be ascribed to suggestion.

Although Vogelsang, Shute, and Shute report "some improvement to complete relief" in 96% of their cases, their results are open to criticism as no controls were used in their investigation, and no mention is made of the duration of the treatment. The dose of 300 mg. daily, administered in the present series, was exceeded in only 9 of the 84 cases treated by Vogelsang and his colleagues, whereas in 44 of their cases less than 300 mg. daily was given. Therefore, inadequate dosage cannot be the cause of the failure of the majority of the present cases to respond. In the present series, even including the 2 cases which showed slight improvement, benefit was obtained by only 4 of the 10 patients.

It is realised that a series of 10 cases is too small for a final judgment of the value of a drug; nor has there been any investigation of vitamin E in congestive heart-failure, for which Vogelsang, Shute, and Shute also make considerable claims. However, these new results are submitted as they do not support those obtained by Vogelsang and his associates. In the past many drugs have had a passing vogue in the treatment of angina pectoris. In order to prevent this happening with vitamin E, I feel that, before it is prescribed widely, much more convincing evidence of its effectiveness should be obtained.

Central Middlesex County Hospital, London, N.W.10. K. P. BALL.

HEALTH AT THE UNIVERSITY

SIR,—In your leading article on this subject (Dec. 27) you mention as one of Dr. Parnell's findings the need of many students for psychological help. This point, I think, deserves underlining and amplifying, especially as it is dealt with rather cursorily in Dr. Macklin's plan for a comprehensive student health service. By adding up from Dr. Parnell's table all those cases in which psychological factors may be imputed ("condition requiring general advice," "minor anxiety," "dysmenorrhœa"), one arrives at a figure of 50%. This figure does not include the possibles hidden among the "gastro-intestinal," "skin," and other groups. It is not enough to refer obvious psychological cases to the university's mental health department as suggested by Dr. Macklin. As long as the majority of physicians have no psychiatric training and experience, many psychosomatic cases in equal need of mental treatment will be lost behind their physical disguises. The need for psychiatric advice at the university is forcefully brought home to us by the number of neurotic and psychotic students sent to this hospital for treatment, often after months and years of educational disappointments, failed examinations, and wanderings through specialists' consulting-rooms.

Moreover, a recent report on mental illness among Army officers[1] has demonstrated the liability of professional men, and especially of doctors, to psychiatric disorders. To quote one of the concluding statements:

> "It is not a satisfactory state of affairs that doctors, lawyers, clergymen and teachers, the counsellors of society, should have in their ranks such relatively high numbers of manic-depressives, schizophrenics and psychopaths."

Here is a promising field of preventive psychiatry. With our present shortage of specialists, we cannot afford, as in some American universities, a whole-time psychiatrist in charge of the students' welfare. But in universities with a chair and department of psychiatry there is clearly a case for making this work one of its responsibilities.

Crichton Royal, Dumfries. W. MAYER-GROSS.

SIR,—The three recent articles and your leading article must needs make those of us concerned with student health reconsider the service available at our respective universities.

Some notes on our experience at Bristol, where student health examinations began first in 1938, may be of interest to your readers.

The university requires all students to submit themselves to an X-ray examination of the chest in each of their undergraduate years, and to undergo a medical examination in each of their first three years. No objection has been raised and very many students have expressed individually their gratitude for the examinations.

The various ways in which the health examinations prove of value have been well brought out in the articles referred to. What has impressed us is that the examinations are often (and should be) more in the nature of private interviews at which any matter affecting the physical or mental health of the student may be raised. It has been a matter of surprise how often really useful discussions have resulted.

The finding and choice of suitable medical officers presents a problem. A university medical officer should have had considerable experience in both medicine and surgery; he should have the respect of students both as a person and as a doctor among doctors (i.e., he should have a higher qualification); and above all he should be keen to put his best into the work. Now it is suggested that such a person will be difficult to find unless additional medical interest is added to the work. At Aberdeen the problem may have been solved by the medical officer being also physician to the students, both at their residences and at hospital. Such a scheme is not practicable in most universities. The difficulty has been met at Bristol by making the medical officers responsible for the health examinations of one "year" of students (approximately 600), the rest of their time being spent working in one of the departments of the medical faculty (assisting, teaching, or doing research work).

It has been suggested that routine examinations may increase iatrogenic disease. Our examinations are conducted far from hospital and sick-bay in the midst of squash courts and gymnasia, and the impression gained is that most students leave feeling encouraged by having been pronounced fit after a thorough examination, and with their minds focused on positive health rather than disease. Finally, our experience of annual mass miniature radiography has justified the trouble and expense over and over again.

H. F. WEST
Medical Officer to the University of Bristol.
Bristol Royal Hospital.

COMPULSORY PHYSICAL EDUCATION

SIR,—Dr. Bolton (Dec. 27) tries to sell the idea of compulsory physical education which he describes as "health promoting"; yet he does not like "dogmatism" or "rigid systems . . . built on unproved hypotheses." Physical training colleges are "narrow-minded" and out of date.

I, and many others I know, would be grateful if he would kindly outline the evidence for the assumption that active participation in sport, particularly compulsory participation, leads to better health in later years. My own, admittedly casual, observations are that any evidence is decidedly the other way.

Durham Medical Students Union, Newcastle-upon-Tyne. J. O. KNOX.

DEATH AFTER MYANESIN ANÆSTHESIA

SIR,—Some points in Dr. Mallinson's letter of Jan. 3 require comment. Our reason for mentioning the observation of Pugh and Enderby that 'Myanesin' can cause hæmolysis was that intravenous hæmolysis, as in incompatible blood-transfusion, can cause shock and hence renal anoxia. Pugh and Enderby properly drew attention to the possible danger of the use of intravenous myanesin. Since the case we reported was an undoubted example of death from renal anoxia, which might have resulted from intravenous hæmolysis, we thought it reasonable to publish the facts so that others might judge of their significance. We were careful to mention that the urine was not examined for hæmoglobin, but as hæmoglobinuria is not an essential feature of the syndrome of renal anoxia this uncertainty was immaterial.

Dr. Mallinson's statement that myanesin causes only, and rarely, a slight and transient fall of blood-pressure is not an entirely adequate insurance against a more serious fall. He suggests that the small dose of 'Pentothal,' nitrous oxide and oxygen, and myanesin used to anæsthetise this patient could have been sufficient only if she were severely shocked by the operation or subjected to severe oxygen lack; yet he is an enthusiastic advocate of this very technique (*Lancet*, 1947, i, 97), and with it considers plane-1 anæsthesia adequate even for gastrectomies. He states that "the average

1. Roberts, W. W., Moore, J. N. P. *Brit. J. soc. Med.* 1947, 2, 135.

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lower laparotomy can often be carried through on 0·5 g. pentothal." This patient was asthenic, weighed only 54 kg., and had already had a barbiturate and an opiate. The subsequent anæsthesia was adequate and there was no oxygen lack.

We explained that our subject showed no post-mortem evidence of rheumatic heart disease or of any other pathological condition except a hyperplastic bone-marrow of obscure nature. Her condition before the operation gave no cause for anxiety. We are sure that if the operation had not been performed she would be alive today. As the operation was a simple appendicectomy the anæsthetic must be suspected.

In our view, untoward incidents in the use of new drugs should be reported early, and our communication was not in the form of a dramatic or haphazard accusation.

T. F. HEWER
University of Bristol. R. F. WOOLMER.

MASS RADIOGRAPHY IN EARLY DIAGNOSIS

SIR,—I found Dr. Hoffstaedt's article of Dec. 27 instructive. If I understand him correctly, he suggests that mass radiography as at present practised should be abandoned as utopian or futile, and that we should wait for symptoms to develop before attempting fluorography.

This controversy of "symptoms" versus "symptom-free" reminds one of the battle which is waged over the genesis of postprimary tuberculosis, one faction supporting the exogenous theory, the other claiming that endogenous reinfection is the revealed truth. In each case one might perhaps suggest that both sides are right and that one view is simply complementary to the other.

For some time I have held that a machine of the type used for routine mass radiography was eminently suitable for the examination of such groups as contacts of tuberculous persons and cases referred by doctors because of symptoms. One machine should be able to deal with all the cases in these two groups from a gross population of 2,000,000, always provided that the unit was truly mobile and that the area to be covered was not too large.

This, however, leaves untouched the symptom-free cases and the patients who in spite of symptoms do not consult their doctor. The importance of dealing with these groups is underlined by the two-year mortality-rate for open cases of tuberculosis found by routine mass radiography; this can be as low as 9%—one-fifth of the mortality-rate for open cases identified after the development of symptoms. Further, as I suggest in a paper shortly to be published, the discovery of cases before they have become sources of infection to their fellows prevents restocking of the infector pool.

The question of response is rather in the nature of a red herring. Whether one is examining the general population, "symptom cases," or contacts, there is sure to be a proportion of subjects who for one reason or another will not coöperate.

I was surprised and disappointed to see that Dr. Hoffstaedt considers that routine periodic surveys are wasteful if, as he indicates, these result in a diminution of tuberculosis in the group examined. Does he believe that any future National Health Service which results in an improvement in the health of the community should be abandoned as wasteful, or that diphtheria immunisation should be dropped?

Finally, I suggest that six sets employed on routine mass radiography plus one set examining the selected groups discussed above would amply serve a gross population of 2,000,000 people.

Middlesex County Council Mass X-ray Unit. W. POINTON DICK.

SIR,—The criticism of mass radiography in your columns is not premature. Recent reports from Lancashire suggest that civilian mass radiography has a limited field in industrial medicine. While of undoubted value in a disciplined community, in society at large mass radiography is nowhere near to being comprehensive in its scope, a negative finding fosters false security in the ignorant, and now Dr. Hoffstaedt has put forward evidence that even when it does reveal pulmonary tuberculosis the diagnosis is not necessarily made at an early stage of the disease. Thus, this expensive tool is not apparently fulfilling early hopes.

What of the established practice of contact examination? More than 5% of all cases diagnosed in this country are picked up in patients under routine surveillance. On analysis of my own cases I have found that the diagnosis of tuberculosis in someone under contact supervision is usually first suspected by his own doctor; the contact-patient complains of mild symptoms and is therefore sent to me forthwith, rather than found to be ill by the routine six-monthly or annual radiograph. It would seem that the important thing in a contact programme is to make the individual appreciate the significance of his contact risk so that he presents himself at the slightest indication of ill health. A healthy man quickly loses his enthusiasm for frequent visits to a chest clinic.

The "Bermondsey plan" instituted by Toussaint and Pritchard is essentially sound. If one offers general practitioners a good diagnostic service they will use it, by using it they will increasingly suspect tuberculosis, and a dividend will be reaped in early treatable cases.

The town for which I am tuberculosis officer has a population of 100,000, and in 1947 2300 new cases were referred to me for examination as compared with 600 three years earlier; and more than half of the sputum-positive cases were good candidates for collapse therapy at the time of diagnosis. For a high proportion of early cases to be diagnosed in this way three conditions must be fulfilled:

1. The tuberculosis officer must command the clinical respect of the local practitioners; he must not be burdened with administration, but backed by good clerical and health-visitor services.

2. No patient should be kept waiting a moment longer than necessary; the examination must be complete; and all introductory letters from doctors must be fully and promptly answered.

3. Early cases with reasonable prospect of recovery must be admitted for treatment within a month, and general practitioners must know that prompt treatment will be offered to their early cases.

I am frankly sceptical of mass "techniques" for diagnosing disease. That diagnostic outpost, the hard-worked general practitioner, appreciates every help that specialist medicine can offer him toward maintaining his diagnostic acumen. The early diagnosis of phthisis must always be sought through the vigilance of the general practitioner.

TUBERCULOSIS OFFICER.

HEALTH EXAMINATIONS

SIR,—There is, surely, a different view of health examinations from that expressed by Dr. Petch in your issue of Jan. 10.

In the first place, the mental approach of the examiner and examinee have to be considered. If the examiner is simply carrying out a routine task, with no interest in his work beyond getting it finished as quickly as possible, it will very quickly become, as Dr. Petch says, a meaningless ritual. If, on the other hand, the examiner is sincerely interested both in doing what he can to help the examinee to overcome any disabilities that may be prejudicial to health, and in the larger objective of observing and recording facts that may help to further our knowledge of the "normal," his work may be as full of satisfaction and usefulness as any.

Again, the coöperation of the examinee is clearly extremely important; and it is interesting how much gratitude is expressed by many examinees for the discovery of correctable disabilities, even though the treatment necessary may involve a considerable loss of income. But to gain this coöperation, it is most important that the examiner's approach be the correct one; and the appropriate attitude requires experience coupled with a sympathetic outlook. Clearly, such coöperation will be far more readily obtained from people volunteering for examination, but it is surprising how much help will be given by others, provided always that the right approach is used.

I feel that Dr. Petch's remarks about the A1 men who were rejected after mass radiography are beside the point. Surely no doctor would pretend either to his patient or himself that by clinical examination alone he could be certain of excluding lung disease. In the same

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way, I am sure that Dr. Parnell would not assert that by regular examinations *all* handicaps are discovered; but there is no doubt whatever that by such attention a great many remediable defects can be pointed out, and cured, before they have become a source of morbidity or mortality.

Finally, I entirely agree with Dr. Petch that our knowledge of the range of normal variation is woefully inadequate. If those conducting health examinations make good use of their opportunities this ignorance will be rapidly dispelled. This alone is an excellent reason for the continuance of such work, and the encouragement of those engaged in it.

London, E.1. ALAN WATSON.

CENSORSHIP OF MEDICAL ARTICLES

SIR,—I have read with interest Dr. Willcox's letter of Jan. 3 and your leading article. I entirely agree with every word you say, and I think your article is particularly timely because it may not be fully realised that in civilian life there is a precedent to censorship of medical articles which could be used in the National Health Service. I am referring to the fact that in many Government departments, which have a medical branch attached, it is not even sufficient to get the permission of the medical man in charge of the department in order to publish a medical article: every publication has also to be submitted to the lay people in charge, for their imprimatur. MEDICUS.

SIR,—During my war service in the R.A.M.C. I was allowed, and indeed encouraged, to forward articles of professional interest direct to the consulting physician of the Command in which I was serving. Most specialists considered that articles intended for publication could be submitted in this way, and in my experience the consultant forwarded the manuscript without delay to the editor of the journal indicated.

It is true that this simple and speedy method of censorship conflicted with King's Regulations (as explained by Dr. Willcox in your issue of Jan. 3), but most of us were willing to take the risk, especially since our consultant also stood to lose by being a party to our indiscretion.

Dr. Willcox's account of the frustrations and delays which he experienced at various relay stations makes lamentable reading, but I question his conclusion that valuable historical matter was lost by the general state of affairs in the Army Medical Services; and I know of at least one consultant who forwarded an article written by a specialist attempting to prove that his consultant's views were sadly out of date.

Warwick. STEPHEN WHITTAKER.

PARA-AMINOSALICYLIC ACID IN TUBERCULOSIS

SIR,—With reference to our recent preliminary communication (Dec. 13), we are asked by Mr. D. E. Seymour to point out that the new method of synthesis of *para*-aminosalicylic acid was evolved jointly by F. S. Spring and D. D. Martin, at Glasgow Royal Technical College, and by himself at Herts Pharmaceuticals Ltd.; and that the joint publication of their method will appear in due course.

Grove Park (L.C.C.) Hospital, London, S.E.12. T. G. DEMPSEY
M. H. LOGG.

MONOCULAR SEASICKNESS

SIR,—I was interested to read the remarks of your peripatetic correspondents about one-eyed persons being immune to seasickness (Dec. 13 and 27). There must be many doctors like myself who lost an eye during the war, and it would be amusing to know if any of them have noticed a change in their susceptibility to this distressing malady.

Anyone who noticed my pitiable state when the Channel steamer reached Folkestone one day last October could only conclude that I may have become a *worse* sailor but hardly a better one. Actually when I was binocular I was an indifferent sailor, and monocularism has not made the slightest difference. (In my own defence I may say it *was* pretty rough that day in the Channel.) Next time—if and when the travel ban is removed—I must try blocking the centralateral ear.

Edinburgh. CLAUD C. M. WATSON.

BLOOD SAMPLES FROM INFANTS

SIR,—In your issue of Dec. 27, Dr. A. V. Magee enumerates various methods for collecting blood from infants. He omitted from his list a very simple method—collection from the superficial scalp veins, which are usually prominent in infants. The procedure adopted is as follows:

The child is wrapped snugly in a blanket to prevent interference by kicking legs or by arms and hands; the hair is cut over the site chosen to display the vein, and while an assistant steadies the child's head the operator introduces the needle; a free flow of blood ensues; the more vigorous the child's cry, the freer the flow. When enough has been collected the needle is removed and the flow is stopped by firm pressure over the bleeding point with a swab of sterile cotton-wool.

This method was employed extensively by the late Prof. Leonard Findlay, of Glasgow, and has been practised by his many former house-physicians.

I should like to add that the route via the anterior fontanelle is not devoid of risk. Several marasmic infants on whom this method was used showed at autopsy thrombosis of the superior sagittal sinus.

London Chest Hospital, Victoria Park, E.2. CECILIA SHISKIN.

OBSTETRIC SHOCK

SIR,—I have read with great pleasure and interest Professor Sheehan's article of Jan. 3. As he points out, the same picture of circulatory collapse may be produced by different mechanisms, and in obstetrics the analysis of causal factors is especially difficult. I should like to draw attention to one point which may be important and which is rarely considered. It is always recognised that blood lost must be replaced. In a few cases this will fail to restore circulatory balance, and occasionally the blood-loss is not large enough to be important. It is in such cases that the difficulties begin, and the progressive character of the syndrome is impressive. In my opinion a state of marked dehydration is often of great importance in these patients. During labour, especially if it is protracted, the excretion of urine and of chloride may fall to a very low level for many hours. The woman often vomits and looks dried up, with parched lips, although she will drink only small amounts. These features may be evidence of serious dehydration which may perhaps initiate or exaggerate a state of circulatory failure. I should like to suggest that transfusion of saline should be beneficial to these patients, and I have had most encouraging results after using this upon two occasions for shock which resisted other treatment. On theoretical grounds excessive and continued transfusion of blood may be actually harmful to these women.

Woking. L. G. HIGGINS.

VISCERAL PAIN

Sir,—Professor Cohen in his interesting paper of Dec. 27, stated that whereas I had enunciated the principle of the summation of visceral and cutaneous pain stimuli, I had failed to face the obvious corollary that subliminal pain stimuli must constantly travel along afferent pain pathways, both from the skin and from the viscera.

In the monograph I published in Colombo in 1941, to which he refers, I postulated "that impulses are always travelling along the cutaneous sensory nerves, but that pain is only appreciated if they reach a certain intensity, or if the threshold to pain of the relevant cells in the pain apperception centre be lowered." I did not postulate that subliminal pain impulses constantly travel along visceral afferent pain pathways for two main reasons: (1) so far as I am aware there is no proof that any viscus, other than the uterus, is supplied with visceral afferent nerves which mediate the sensation of pain; and (2) there is no experimental evidence which warrants such an assumption. Visceral pain can be abolished by anæsthetising the cutaneous areas to which it is referred, but there is, so far as I know, no evidence that cutaneous pain can be relieved by anæsthetising visceral afferent nerves.

Idle, Bradford. G. W. THEOBALD.

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REFORM IN HOSPITAL

SIR,—In connexion with Mr. Parry's wise article of Dec. 13 some remarks about hospitals recently made to me by various people who have been patients will interest you. After all these are the persons whom the hospitals' prime purpose is to serve. We may reasonably treasure their kind remarks and review their criticisms to see whether they can be met.

A lady of 50, to whom I paid a social visit when she was in hospital, was puzzled to know why in that lovely new building she had to get up at 5.30 A.M., wash, and then wait till 7 A.M. for breakfast.

A man was transferred to another hospital. For a fortnight he waited uncertain why he had been moved and what was to be done. Nobody stopped to let him ask and to answer his questions. He was examined on admission, taught on a week later, and then, a week later still, he was told one morning that he was to go to the theatre that afternoon.

Another man was sent 200 miles to a hospital to see a consultant about having a new growth operated on. He arrived too late for that week's visit; the next week's visit was omitted as it was a national holiday. His family travelled up to see him and wondered why nothing was done for two weeks as there had been some urgency to move him to London.

A patient with phthisis was upset by hearing his doctor during a round point to his X-ray film and remark that the cavity was still open.

Two people having been in different hospitals both wondered why it was necessary for the night sister to shine a torch on their faces to see if they were asleep.

A patient and her relative wondered why she was told to come back to the outpatient department the next day to provide a specimen of urine. She was ready to oblige but the nurse was too busy.

What irks these patients and their families is that they feel that it is *unnecessary* to

get up so early
be left in uncertainty
wait 2 weeks to see the doctor
overhear bad news of one's health
be woken during the night
make a special visit.

It is especially important that they should be avoided in teaching hospitals—the seven patients' remarks quoted above refer to five teaching hospitals—because students may conclude that they are unavoidable.

London, N.W.1. RONALD MACKEITH.

THE PLEBISCITE

SIR,—I detect in Dr. Jewesbury's letter last week a glimmer of fundamental disagreement with the Act, obscured by the shadow of personal economic necessity.

Let us, whether specialists or general practitioners, try to be honest in our answer "Yes" or "No." Above all, let us look beyond our own generation and answer in the light of our principles. Do we honestly consider that this Act, as it stands, is consistent with the principles of the great profession of which we are members, and is it in the best interest of the patients whom we serve?

I have talked with many colleagues, read much, and attended numbers of meetings. I anticipate that the backbone of the profession—the general practitioners—will give a resounding "No." Consultants and specialists are doubtful, since the Spens Committee has not yet reported and the "terms of contract" remain therefore unknown.

But there is more than enough ravishing of principle in the wording of this lamentable Act to determine which answer should be received from consultants and specialists. If their answer is also unequivocal and the profession remains undivided, then the Act will *have* to be amended.

London, W.1. DOUGLAS ROBERTSON.

SIR,—Before the plebiscite several subjects need consideration.

Right of Appeal to the Courts.—If the Minister, or any body set up by him, has failed to carry out the provisions of the National Health Service Act, or if there has been a breach of contract, or if the General Medical Council has not heard evidence that it should have heard, then there already exists the right of appeal to the ordinary courts of justice. As regards appeal on a point of law, therefore, no further action is necessary.

It is also important, however, that if a practitioner feels himself aggrieved at the decision of the local executive council, the tribunal, or the Minister, he should be able to appeal to the High Court on the question of fact, and that the court should then try the case again de novo. Under the National Health Service Act the Minister can impose severe penalties, acting on evidence of a domestic or hearsay nature. In the re-trial which should be allowed the case would be conducted by purely legal methods.

Buying and Selling of Practices.—In entering a service financed by the Exchequer the doctor necessarily becomes a servant of the State and as such is unable to sell his appointment. Here are two recent quotations from the *Times*:

> "Entry into the service by the purchase of vacancies in it, is a method of recruitment which, if Parliament had permitted its continuance, would soon have been seen to be as anomalous as recruitment of Army officers or clergymen by the sale of commissions or livings."
>
> "The trade in publicly remunerated practices would be an anomaly which could not in any event have been tolerated for long. Under the new dispensation it would have obliged all new doctors to buy their way into a publicly remunerated service."

Partnership Agreements.—The Minister says that if he is wrong he will have amending legislation introduced; but he does not say whether such amending legislation will be retroactive. It would be much wiser to have this difficult matter settled before the new service comes into force. Partners could then vary, amend, or alter their agreements if necessary.

Remuneration.—Let me summarise the relative advantages of payment by salary and by capitation fee:

Salary	*Capitation Fee*
(1) No competition for patients.	(1) Continuous competition for patients.
(2) Little financial incentive to increase work: therefore sufficient time can be given to patients.	(2) Strong financial incentive to take more work than can be done well.
(3) Coöperation between doctors at health centres would be easy.	(3) Coöperation between doctors at health centres would be very difficult.
(4) Doctors my colleagues.	(4) Doctors my rivals.
(5) Patients would have the advantage of general-practitioner consultations.	(5) Patients would have to depend upon specialists for consultations.
(6) Doctor can practise his craft.	(6) Doctor builds up a business connexion.

The British Medical Association argues that doctors are opposed to payment by salary; yet for those who voted in the plebiscite of 1944 the figures were as follows:

In health centres: 28 % favour salaries; 34 % favour basic salary and capitation fee.
Outside health centres: 15 % favour salaries; 35 % favour salary and capitation fee.

My own experience is that the younger men favour a salaried element while the older men are against it.

There is one very important point, however, that has not been given the importance it deserves. The Spens Committee suggested a capitation fee of 15*s*., at the 1939 value of money, and the Minister's present proposals do not come up to this recommendation. Let us concentrate on this point rather than wrangle over a small basic salary which in the profession as a whole is not viewed unfavourably by a large minority.

Worthing, Sussex. HAROLD LEESON.

DETERMINATION OF HÆMOGLOBIN

SIR,—In their article of Nov. 29 (p. 789) Professor King and his associates reproduce a curve of the absorption of carboxyhæmoglobin, using also values determined by me and quoting *Novin Lekarsk. Poznanin*, 1926, 83, 10. Readers interested in my paper will hardly be able to find this journal, but, if successful, will be disappointed because no paper of mine has ever been published there. The values mentioned by the authors were published in the *Zeitschrift für physiologische Chemie* (1926, 151, 130). FELIX HAUROWITZ.

Department of Medical and Biological Chemistry, Medical Faculty, University of Istanbul.

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Obituary

EDWARD WILLIAMS HEDLEY

M.B.E., M.A., M.D. CAMB.

Dr. E. W. Hedley, who died on Jan. 3, at the age of 74, at his home at Thursley, below Hindhead, was the son of the late Dr. John Hedley, a prominent general practitioner of Middlesbrough. His mother was an ironmaster. The eldest of a large family, Edward Hedley had many medical relatives—his younger brother is J. P. Hedley, and his sister married Mr. Douglas Harmer.

From Uppingham he gained a scholarship to King's College, Cambridge, where he took a first in the first part of the natural sciences tripos, and in 1896 he came to St. Thomas's with a great reputation. He qualified in 1900 and, despite severe competition, became a house-physician and H.P. to the obstetrical and gynæcological department, where he came under Cullingworth, Walter Tate, and John Fairbairn. He then settled in Hans Place, later moving to Pont Street, and in connexion with the small but lucrative general practice which he quickly accumulated he made many close and loyal friends. When a vacancy as anæsthetist occurred at his old hospital he was elected, following the practice usual in those days of appointing successful London general practitioners to do this work.

In 1915 St. Thomas's became the 5th London General Hospital and Hedley was commissioned captain R.A.M.C. as an anæsthetist, while continuing his civilian work. He was also attached to several officers' hospitals in London and was officer in charge of 53, Cadogan Square, being appointed M.B.E. in recognition of his services. When he reached the age-limit at St. Thomas's he was made a consulting anæsthetist and elected a governor of the hospital. In 1937 he retired to Thursley and gave up all medical work. "Anæsthesia in the first decade of this century was crude and simple, compared to present-day work, and Hedley" (writes a colleague) "remained conservative. In 1912, when many new techniques, such as deep ether, intratracheal anæsthesia, and intravenous work were in full swing at the hospital, he stuck to his methods and was apt to be critical in his own delightful and inoffensive manner. But there are many hundreds of practising anæsthetists in the country who gratefully remember the sound, safe, and practical groundwork given them by Edward Hedley. Even nowadays much could be said in favour of such teaching before proceeding to the more complicated techniques.

"At St. Thomas's, as in practice, Hedley was always a cheery and good companion, popular with his colleagues and students alike, and when he retired he entered into country life with zest. There was not a parochial society connected with the district in which he did not take an active interest. During the war he was prominent in the A.R.P., Red Cross, and British Legion, and anyone present at his funeral service in the little old parish church must have been impressed by the attendance of so many of the local and village people."

Hedley leaves a widow, daughter of the late Mr. Theodore Hornung, of Middlesbrough, two sons, and two daughters.

HENRY MARTIN MOGRIDGE WOODWARD

M.A. OXFD, M.R.C.S.

Dr. H. M. M. Woodward, consulting bacteriologist to St. John's Hospital, Lewisham, who died at his home at Blackheath on Jan. 2, was the son of the late Dr. Martin Woodward, of Pershore, Worcestershire. He was educated at St. Edward's School and Keble College, Oxford, and in his early days and until his health broke down he was a keen athlete. An enthusiastic supporter of the drama, he was for a time himself on the stage, but he finally decided to take up medicine and qualified from Guy's Hospital in 1904. While a house-surgeon at St. John's Hospital, Lewisham, his interest in bacteriology was aroused by the enthusiasm of the late Dr. Ernest Ofenheim, who was a pupil of Sir Almroth Wright. Woodward was also encouraged by Arbuthnot Lane, who was then on the staff of St. John's. After serving as director of the venereal-diseases department at the Seamen's Hospital he returned to St. John's to take charge of the bacteriological and V.D. departments there, and he also became consulting bacteriologist to the Purley War Memorial Hospital and the Kent and Canterbury Hospital.

In 1939 Dr. Woodward was due to retire, but instead he continued through the war, blitz or no blitz, to attend the hospital's laboratory daily. For many years he served on the board of management of St. John's as a governor and as a representative of his medical colleagues, and he was chairman of the medical committee for the last fifteen years of his active service. An extremely well read man, Dr. Woodward maintained to the end his interest in literature and the classics.

He married Miss Elizabeth Thompson, a sister at St. John's, who survives him.

P. F. A.

Mr. A. W. CHURCHILL, who died on Jan. 6, had been associated for over fifty years with J. & A. Churchill, publishers of medical and scientific books and the *Medical Directory*. He retired from his position as managing director of the company in 1946 owing to advancing years, but he continued to serve on the board.

Diary of the Week

JAN. 18 TO 24

Monday, 19th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. F. W. Holdsworth: Fractures Involving the Knee-joint.

HUNTERIAN SOCIETY
8.30 P.M. (Mansion House, E.C.4.) Prof. J. Cid Dos Santos (Lisbon): Vascular Obstruction.

Tuesday, 20th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. E. P. Brockman: Congenital Deformities of the Foot.

SOCIETY FOR THE STUDY OF ADDICTION
4 P.M. (11, Chandos Street, W.1.) Mr. V. Zachary Cope: Economic Aspects of Tobacco-addiction.

EUGENICS SOCIETY
5.30 P.M. (Burlington House, Piccadilly, W.1.) Dr. H. Harris: Sex Limitation in Human Genetics.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pathological demonstrations.

Wednesday, 21st

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. R. Broomhead: Muscle and Tendon Ruptures.

Thursday, 22nd

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Philip Wiles: Postural Deformities of the Spine.

MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, W.1.) Sir Theobald Mathew: Office and Duties of the Director of Public Prosecutions.

Friday, 23rd

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. A. J. Watson: Ankle-joint Fractures.

ROYAL COLLEGE OF OBSTETRICIANS AND GYNÆCOLOGISTS, 58, Queen Anne Street, W.1.
5 P.M. Dr. Stanley Way: Primary Carcinoma of the Vagina.

UNIVERSITY COLLEGE, Gower Street, W.C.1
5 P.M. Dr. E. Ashworth Underwood: Heritage of Medicine. (First of six lectures.)

WEST LONDON MEDICO-CHIRURGICAL SOCIETY
8.30 P.M. (South Kensington Hotel, 41, Queen's Gate, S.W.7.) Dr. A. Morton Gill, Mr. I. M. Orr: Modern Surgical Treatment of Peptic Ulcer.

LONDON CHEST HOSPITAL, Victoria Park, E.2.
5 P.M. Dr. C. J. Hodson: Radiological Diagnosis in Trauma of the Lungs.

ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh
8 P.M. Mr. Kenneth Walker: Body and Mind.

Saturday, 24th

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES
2.30 P.M. (11, Chandos Street, W.1.) Dr. J. Purdon Martin: Treatment of Neurosyphilis with Penicillin.

BRITISH ASSOCIATION OF ALLERGISTS
2.30 P.M. (Wright-Fleming Institute of Microbiology, St. Mary's Hospital, W.2.) Dr. John Freeman: Forty Years of Allergy. Mr. Frank Coke: Advancing to the Future in Allergy.

BIOCHEMICAL SOCIETY
11 A.M. (Postgraduate Medical School of London, Ducane Road, W.12.) Short papers.

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Notes and News

POSTGRADUATE STUDENTS FROM CZECHOSLOVAKIA

EIGHTY young Czechoslovak doctors are to work in British hospitals this year as the result of discussions between Mr. Aneurin Bevan and Dr. Adolf Prochazka, Czechoslovak minister of health. Fifteen will be in Britain for three months, and the remainder for a shorter stay. They will attend hospitals in London, Birmingham, Bristol, Cardiff, Edinburgh, Glasgow, Leeds, Liverpool, Manchester, Newcastle, and Sheffield. When in London, Dr. Prochazka spoke of Czechoslovakia's great need of British medical books; especially valuable are microfilms of irreplaceable books destroyed during the German occupation. He also hopes to see an extension of the scheme by which British miners and other workers last year spent recuperative holidays at Czechoslovak spas and health resorts, and he believes that such visits form a strong link between the two countries.

"IN PURSUIT"

Dr. Mervyn Archdall, editor of the *Medical Journal of Australia*, has a philosophic turn of mind, and a nice taste in quotations. Many of his editorials, written during the past fifteen years or so, have had more than a fleeting interest; and at the request of friends he has now published some of them.[1] They are thoughtful essays, written with grace; and the underlying mood is always hopeful and constructive. Dr. Archdall ranges widely—from humanism and science to cabbages and corsets—but never as a dogmatic exponent: rather he is the modest and often penetrating student of the nature of men and things. His book is thus rightly named, and a quotation from its pages sums up this aspect of his philosophy: "On the present plane of existence man will never apprehend truth; he is destined always to pursue and never to overtake it. This is what gives zest to life."

LAENNEC

Dr. Foxe has given us a most poignant memoir of Laennec.[2] Indeed, the vicissitudes of the unfortunate René are at times almost too harrowing. Only a writer well versed in psychiatry and psychopathology could have depicted so vividly this brief storm-tossed life. Laennec, a child of fancies and dreams—a poet by nature—was always delicate, and passed as a boy through the fires of the French Revolution, which indeed began to burn in his native Brittany. Not blessed with understanding relatives, poor and often starving, and baffled by recurrent illness, he was old beyond his years. In such an atmosphere, he lived alone. He did not take enthusiastically to medicine at first but he was already a lecturer at the age of 22. But he was consumptive, and lived only long enough to give to the world of medicine the stethoscope which helped to transfigure physical diagnosis.

OUR EVACUEES

IN the late war some three-quarters of a million schoolchildren were evacuated from the great cities. How have their lives been influenced? A Barnett House study group has attempted to answer this question in a report[3] from Oxford which complements the earlier study from Cambridge.[4] As might be expected, successful development, according to educational criteria, was found to have a positive correlation with favourable factors such as permanency of billets and the conscious coöperation of parents and foster-parents. Unlike some other observers, those at Oxford concluded that the children were very sensitive to differences in social standards: their adaptation to a new environment was often an educational achievement. Successes in the provision of a broad education for many of these youngsters has encouraged hopes of a wider school curriculum for urban children, to include two or three sojourns in country departments during their school career. The report concludes that life in exile from home "undoubtedly helped many children to a mature outlook and feeling of responsibility."

1. In Pursuit: a Selection of Editorial Writings. Sydney: Australasian Medical Publishing Company, 1947. Pp. 120.
2. Plague. A. N. FOXE, M.D. New York: Hobson Book Press. 1947. Pp. 122. $2.50.
3. London Children in War-Time Oxford. By a Barnett House Study Group. London: Oxford University Press. 1947. Pp. 113. 6s.
4. The Cambridge Evacuation Survey: A Wartime Study in Social Welfare and Education. Editor: Susan Isaacs. 1941.

A NEW JOURNAL FOR PARAPLEGICS

THE Paraplegic Branch of the British Legion are to be congratulated on a new quarterly, named—with the robust and cheerful irony which severe bodily injury begets—*The Cord*. This little journal, well printed, capably planned, and with a nicely balanced cover, will print articles of interest to paraplegics, news of events affecting them as well as personal news of members of the branch, and a short story, winner of a quarterly competition. The first issue carries, besides a good story, an account of Sir Ian Fraser's visit to the Ministry of Pensions Spinal Centre at Stoke Mandeville Hospital, and articles on living at home, on houses for paraplegics, and on Chaseley Hospital, at Eastbourne, which is both a home for long-term paraplegic and poliomyelitis cases and a convalescent home for those paraplegics who normally live at home but need a holiday. In a leading article Captain P. F. Stewart, the editor, notes that one aim of the branch is to promote the best interests of those suffering from spinal troubles, and to give them the help of the Legion in all problems to do with pensions, employment, and housing.

CONTROL OF VENEREAL DISEASE

THE general assembly of the Union Internationale contre le Péril Vénérien, at a meeting in Paris last October, urged the World Health Organisation and all governments to study the possibility of extending the Brussels International Agreement to become an International Antivenereal Convention which should define the minimum provision against venereal disease required by each country, and should lay down measures for the tracing of infective contacts beyond national frontiers. The assembly decided to convene an international conference of the voluntary antivenereal-disease organisations, and to constitute a committee for liaison with the World Health Organisation. Finally, this resolution was passed:

> "The U.I.P.V., believing that experience has shown that the indiscriminate use by the public of sulphonamides has created sulphonamide resistance in gonococcal and other infections, draws the attention of the medical world to the dangers to public health likely to arise from the oral administration of penicillin."

JOURNEY TO THE INTERIOR

INSIGHT into the disordered mind can be gained, for the sane, by the reports of those who come back from the dark country of a mental illness; but few are willing to dwell on that past, or to write down what they remember of it. Much was made clear by Mr. J. A. Howard Ogdon, in his book *The Kingdom of the Lost*[1]; and another book, written much earlier, bears him out. *The Philosophy of Insanity*[2] is an account of his mental illness written in 1860—and beautifully written—by "a late inmate of the Glasgow Royal Asylum for Lunatics at Gartnavel." The book has been republished at the request of the Washington School of Psychiatry, and in an introduction Dr. Frieda Fromm-Reichmann, lecturer at this school, notes how much it contains "of the wisdom which modern psychiatrists and lay people have still to learn and to teach today, nearly a century after the anonymous inmate of a mental hospital learned it from his own experience and felt called upon to teach it. . . ."

Like Mr. Ogdon, the writer of the book shows how sensibly the mentally ill patient acts if his false beliefs are taken into account. While at Gartnavel, he was convinced "that the asylum was a barrack for banditti," and believed that if he gave his wife or any other friend the slightest hint of this they would never be allowed to leave the place alive. He imagined he heard one of his children crying "I'm hungry, father," in a voice which grew daily weaker; and he began to leave his own food in a corner, hoping that the child might "fall in with it in his wanderings." He describes how "apparently unnatural conduct" in some mentally ill patients springs from "motives which, could we trace them, would command pity, veneration, and love." Thus a man who turns from, and refuses to acknowledge, his wife and children, "may believe with an intensity of belief which no man who has always been sane can ever imagine, that to acknowledge them as his would cause their eternal destruction." These instances may be set beside Mr. Ogdon's account of how he locked a garret door and threw the key away, how later in the day he broke the same door open with a crowbar, and how on the next day he tried to throw himself from the window of the same room. His first action, in locking the door and losing the key was an attempt to defeat the suicidal impulse which later gained

1. See *Lancet*, 1947, ii, 880.
2. London: Fireside Press, 1947. Pp. 116. 12s. 6d.

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the upper hand; but to onlookers his conduct must have seemed wholly irrational.

It is in this attempt to make the sick mind comprehensible to the sane that *The Philosophy of Insanity* is a remarkable and valuable book; but it contains much of interest besides. The writer could not praise too highly the care he received from doctors and nurses, or the cleanliness and comfort of the hospital. "In this asylum," he said, "there is nothing that requires concealment. I have been through it very often, by night and by day, and never did yet see a single instance of harshness towards any patient." He was in the private wards, it is true, and he wrote with less confidence of public wards—"the empty desolate-like appearance of the long galleries" in which patients spent their days, the "unhome-like" large apartments in which they slept. He pleaded for classification of patients—"without classification, there always will be a large and increasing amount of confirmed, incurable lunacy"—and for "small, snug, home-looking places" for patients with a prospect of cure. The best part of a hundred years have not sufficed to bring about reforms which patients have long known to be necessary.

University of Oxford

On Dec. 13 the following degrees were conferred:

B.M.—P. J. R. Nichols, E. M. Vaughan Williams, Leon Bagratuni, P. B. Croft, W. M. D. Fairbank, J. H. Lloyd Jones,* B. R. Hunt,* P. S. Moore,* Anne Gall, Marie Sadka.

* In absentia.

University of St. Andrews

At recent examinations the following were successful:

M.B., Ch.B.—M. S. Boyd, Herta Braunova, I. A. Campbell, Margaret E. Dougall, W. B. M. Howie, I. R. Lindsay, E. M. Little, R. A. Maxwell, Rose G. Soutter, Moyra R. Treasure, J. E. H. Tullis.

University of Glasgow

On Jan. 10 the following degrees were conferred:

M.D.—T. N. Fraser, W. A. Parker (with honours); A. H. Imrie (with high commendation); N. R. Cowan, T. N. Cowie, W. P. D. Logan, Eileen S. M. Wybar (with commendation); Joseph Berkeley, R. J. Gourlay, D. N. Ross.

M.B., Ch.B.—Joan M. S. Armstrong, J. B. Brennan, A. G. Chryssides, A. D. Craig, M. B. L. Craigmyle, J. M. Cuthill, D. E. Donald, J. A. Fergusson, A. A. Garven, I. M. Hall, James Harper, J. S. H. Inglis, J. W. Junor, Robert Kelly, Margaret M. Kerr, D. G. Landells, Austin McCawley, Kennedy McCreath, Alexander McDonald, R. L. McGhie, R. W. L. McLeish, M. C. Macnaughton, Robert Mathieson, F. W. Meichen, Elizabeth M. Miller, Mary S. Mowat, Christine L. H. Noble, J. P. Ommer, D. H. Paterson, I. T. Patrick, J. J. Pollock, D. C. T. Rankin, J. A. W. Reid, J. F. Robertson, J. W. Scott, Matthew Shearer, Joan M. S. Silver, D. A. Smith, Jean M. Struthers, D. R. H. Urquhart, J. G. Walker, H. W. E. White, Jean A. S. Wilson.

University of Liverpool

Mr. J. T. Morrison has been appointed full-time dean of the faculty of medicine in succession to Prof. T. B. Davie. Mr. Morrison is lecturer in clinical surgery in the university.

University of Durham

Prof. J. B. Duguid, professor of pathology and bacteriology in the University of Wales, has been appointed to the chair of pathology at King's College, Newcastle-on-Tyne.

Dr. Duguid, who is 52 years of age, was educated at the Friends School, Wigton, and at Robert Gordon's College, Aberdeen. He studied medicine at Aberdeen University, and after two years' war service in France graduated M.B. in 1920, taking his M.D. with highest honours five years later. After holding house-appointments he was assistant to Prof. T. Shennan in the department of pathology at Aberdeen till in 1925 he became lecturer in morbid anatomy and histology at Manchester. In the following year he was appointed to a similar post in Cardiff, and in 1932 succeeded to the chair. Professor Duguid's investigations include work on the experimental production of arterial disease in animals by the administration of chemical poisons and by abnormal dietetic factors, and on the effects of overdoses of vitamin D in causing renal lesions. He has also published papers on cardiac hypertrophy in experimental nephritis and on the development of fibrosis in the kidney.

Registration Under the Medical Practitioners Act

Doctors with foreign qualifications who, in accordance with the Medical Practitioners and Pharmacists Act, are seeking to have their names placed on the Medical Register will shortly be able to obtain forms of application from the Registrar, General Medical Council, 44, Hallam Street, London, W.1. All inquiries should be submitted to this address except those concerning the departmental approval of hospitals or other institutions for the purpose of this Act or registration under the Polish Resettlement Act; inquiries on these subjects should be addressed to the Ministry of Health or the Department of Health for Scotland.

Royal College of Physicians of London

During February and March a postgraduate course in general medicine will be given at the college. On Monday, Feb. 2, at 5 P.M., Lord Moran will give the first lecture, on Pain, and the other lecturers will include Dr. Russell Brain, Dr. Thomas Hunt, Dr. G. E. Beaumont, Dr. H. L. Marriott, Dr. J. M. H. Campbell, Prof. Henry Cohen, Dr. J. Forest Smith, Dr. Evan Bedford, Prof. E. C. Dodds, F.R.S., Dr. J. St. C. Elkington, Prof. A. J. Lewis, Prof. R. V. Christie, and Sir Lionel Whitby. Applications for tickets should reach the college, Pall Mall East, S.W.1, by Jan. 26.

On Tuesday and Thursday, Feb. 10 and 12 at 5 P.M., Prof. G. S. Wilson will deliver the Milroy lectures at the college. He is to speak on the Public Health Laboratory Service.

Royal College of Surgeons of England

At a meeting of the council held on Jan. 8, with Sir Alfred Webb-Johnson, the president, in the chair, diplomas of fellowship were granted to M. S. Brett and P. A. Ring, and a diploma of membership to J. Davenport. The following diplomas were awarded jointly with the Royal College of Physicians:

D.T.M. & H.—B. L. P. Brosseau, J. D. Cruickshank, A. J. Fulthorpe, D. B. Jelliffe, L. F. Koyl, Stanley Miles, A. M. Pugh, P. D. Stewart.

D.P.M.—E. S. Foote, William Forster, C. E. L. Haffner, H. E. W. Hardenberg, N. C. Horne, Shafica Karagulla, Max Klass, H. S. Klein, Aaron Lask, Nicholas Morrissy, D. F. D. O'Neill, Nydia E. Panton, Maurice Silverman, Margaret S. S. Small, Jeannie E. Stirrat, Clifford Tetlow, J. I. Timothy, V. J. K. Wright.

D.L.O.—Hazley Anderson, L. V. Arundel, J. C. Ballantyne, Ben Bellon, G. R. Evans, Julius Fine, H. S. Gild, E. W. Jarratt, R. H. S. Lee, I. J. L. Morris, Kevin O'Brien, M. A. O'Brien, B. H. Pickard, Q. R. Schindler, A. K. Sear, B. K. Sengupta, Ross Smith, R. W. Tipple.

D.A.—J. J. L. Ablett, Aileen K. Adams, J. T. Anderson, G. E. Badman, I. N. Bahl, H. C. J. Ball, A. K. Bannister, V. B. Bhargav, J. R. Bodington, J. A. Bowen-Jones, H. C. Burbidge, G. W. Campbell, D. M. Carnegie, J. H. Challenger, H. J. E. Christie, Samuel Citron, R. F. Connell, H. S. A. Corfield, J. L. S. Cresswell, David Dangerfield, Adolph Danin, D. H. Davies, Doreen Davies, G. G. Donaldson, C. H. Dunn, W. O. M. Ede, E. M. Edwards, J. L. C. Fernando, R. A. Fisher, F. W. A. Fosbery, C. M. Friedland, J. R. Gallie, R. E. Gibson, L. A. Gifford, Muriel M. Gloster, R. N. Grabowsky-Atherstone, Margaret A. Griffiths, John Hamilton, Phœbe N. Harvey, D. R. Hughes, A. M. Hutton, J. N. T. Hutton, D. H. Irish, L. H. James, Harold Jefferson, James Johnston, D. F. McAlpine, George McLoughlin, M. C. Macqueen, H. B. Maliphant, J. P. Murphy, Aelred O'Connor, Barbara D. Owens, J. G. Peacock, G. F. Purves, Leslie Rendell-Baker, J. R. Rook, E. H. Seward, D. W. Shannon, J. C. Skelley, A. C. Smith, G. H. Stuart, V. V. Tarvadi, L. L. Theron, Betty Thomas, J. M. van de Walle, Frederik van Nouhuys, N. S. Walls, Harris Waters, D. S. Wilson, J. R. J. Winter, John Woodley, A. P. Wright, G. V. S. Wright.

D.I.H.—George Buchanan, H. F. Chard, F. H. King, Peter Pringle, M. W. Robinson, R. S. F. Schilling, C. L. Sutherland, A. L. Thomas, D. R. Thompson, Hubert Wyers.

Prof. Geoffrey Hadfield has been appointed to the Sir William H. Collins chair of human and comparative pathology in succession to Dr. R. A. Willis.

Professor Hadfield, who is 58 years of age, took his M.B. Lond. from St. Bartholomew's Hospital in 1911 and was awarded the university gold medal for his M.D. thesis two years later. After holding house-appointments at Barts he spent two years as assistant pathologist at the Dreadnought Hospital, Greenwich. During the 1914–18 war he served with the rank of captain R.A.M.C. as specialist in pathology in France and Gallipoli. Soon after demobilisation he became demonstrator in pathology at Bristol University and pathologist to the Bristol General Hospital. In 1928 he was appointed to the chair of pathology at the Royal Free Hospital. In 1933 he returned to Bristol as professor of pathology, till two years later he was elected to his present chair at St. Bartholomew's Hospital. His published work includes the volume on pathology in the *Recent Advances* series (with L. P. Garrod), and papers on the pathology of tumour formation and cardiac infections. Dr. Hadfield was elected F.R.C.P. in 1932, and he is consulting pathologist to the Army.

Medical Society of London

On Mondays, Feb. 16, 23, and March 1, at 9 P.M., Dr. C. E. Dukes will deliver the Lettsomian lectures. His subject will be Clinical Pathology in Relation to Medical Practice. At 8.30 P.M. on Monday, May 10, Dr. A. H. Douthwaite will deliver the annual oration, on the Lure of Drugs.

Foundling Estate

The Dominion Students' Hall Trust, to provide scope for its increasing activities and to further ancillary objectives of a charitable or educational nature centred in Bloomsbury, has acquired the Foundling Estate which surrounds its headquarters at London House, Guilford Street. The estate was purchased about 1740 by Captain Coram to endow the old Foundling Hospital for children, which was removed to Berkhamsted in 1926. Parts of the estate have been sold from time to time and it is the remaining portion which has now been purchased by the trust.

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Order of St. John of Jerusalem

The King has sanctioned the following promotions in, and appointments to, this order:

As Knights.—Harold Francis Joseph Norrie, M.B., Brigadier William Wallace Stewart Johnston, C.B.E., D.S.O., M.C., M.D., Colonel Herbert Henry Ernest Russell, O.B.E., M.D., F.R.C.P., Major-General Sir Robert Hay, K.C.I.E., K.H.P., I.M.S., Colonel Edward Cotter, C.I.E., V.H.S., I.M.S.

As Dame.—Frances Christina Burrell McKay, M.B.

As Commanders.—William Benton, M.R.C.S., Robert Douglas Argyll Douglas, M.B.E., M.D., F.R.C.S.E., Henry Richard Rishworth, C.B.E., F.R.C.S., Colonel Norman Briggs, C.I.E., V.H.S., I.M.S., Carl Damien Newman, M.B., Seemampillai Francis Chellappah, O.B.E., M.R.C.S., James Johnston Abraham, C.B.E., D.S.O., M.D., F.R.C.S., Edgar Scott Bowes, M.R.C.S., Lieut.-Colonel Ernest Albert Harold Russell, M.B., Major-General Frederick Arthur Maguire, C.M.G., D.S.O., M.D., F.R.C.S., Colonel Lewis Herbert Albin Roy Huggard, M.D.

As Officers.—Francis Henry Edwards, M.B., F.R.C.S., Thomas Parham Lalonde, M.B., Frederick William Hebblethwaite, M.B., Emmanuel Prinski Scott, M.B., Desmond Manus MacManus, M.B., Colonel Thomas Edward Holland, M.D., F.R.C.S.E., William Megaw, M.B., Captain Charles John Evers, M.D., John Colin Dixon Carothers, M.B., Rupert Victor Samuel Cooper, M.B., Clifford Reynolds de Clifford Sadler, M.R.C.S., James Mackenzie, M.D., Major Albert Ehrmann, O.B.E., M.R.C.S., Edmund Harvey Lodge, M.B., Colonel Alexander Menzies McIntosh, M.B., Air-Marshal Thomas Ernest Victor Hurley, C.M.G., C.B.E., M.D., F.R.C.S., Ramiro Cauchi Inglott, M.B.E., M.D., Lady Ramsden (Margaret Ramsden, M.D.).

As Associate Officers.—Major Debi Prosad Mitra, M.B., Rai Sahib Bhagwant Gopal, M.B., Khan Bahadur Haji Rashid Ahmad, O.B.E.

Kent and Canterbury Hospital

Clinical meetings are to be held at this hospital, at 5 P.M. on the last Friday of each month, beginning on Jan. 30.

University College, London

Mr. F. Bergel, PH.D., will give five lectures on pharmacological chemistry at 5.15 P.M. on Tuesdays, beginning on Jan. 20, in the physiology theatre of the college, Gower Street, W.C.1.

Beds for Streptomycin Treatment

The number of beds reserved in hospitals in the United Kingdom for streptomycin treatment has been increased in the last few months to about 200. Four additional teaching hospitals have been brought into the scheme—University College Hospital, London; Addenbrooke's Hospital, Cambridge; Radcliffe Infirmary, Oxford; and King's Cross Hospital, Dundee. The 24 hospitals now concerned have been asked to continue to restrict treatment with the drug to cases of tuberculous meningitis and miliary tuberculosis, but it is unlikely that all cases of these two types of disease can yet be accommodated.

Doctors who have such cases should get in touch with the nearest convenient hospital with beds for streptomycin treatment, or (in the London area) with the Emergency Bed Service (telephone Monarch 3000).

His Honour Tom Eastham, K.C., senior official referee of Supreme Court of Judicature, received a knighthood in the New Year honours list. He graduated M.B. in the Victoria University of Manchester in 1902.

Dr. Osten Holsti, who holds the chair of general medicine at the University of Helsinki, is spending three months at the Postgraduate Medical School of London as a visiting professor. During his stay he will take part in the teaching and research of the department of medicine at the school.

The Royal National Hospital for Rheumatic Diseases, Bath, has issued its first bound volume of *Reports*, being a collection of papers published by the medical staff. This promising series begins with papers published in 1946, and covers such topics as diagnosis and treatment in rheumatoid arthritis, gold therapy, sedimentation-rate in rheumatoid conditions, acute arthritis, the formol-gel test on plasma and serum in rheumatic cases, and muscle lesions in arthritis. We hope this first volume may have many equally useful successors.

Appointments

DORAN, D. M. L., M.A., B.M. Oxfd: director, department of physical medicine, West Middlesex County Hospital.
FITZHERBERT, JOAN, M.R.C.S., D.P.M.: asst. county M.O. psychiatrist, Kent education committee.
GEOHEGAN, V. P., M.B. Leeds, D.P.H.: asst. county M.O.H., West Sussex, and M.O.H., Arundel, Chichester, and Midhurst.
HOLMES, J. M., M.D. Leeds, M.R.C.P.: visiting neurological physician, Wrexham County (E.M.S.) and War Memorial Hospitals.
JAMES, DORA, M.B. Melb., D.OBST.R.C.O.G.: asst. M.O., maternity and child welfare, Beds.
LEYSHON, V. N., M.D. Lond., D.P.H.: M.O.H. and chief school M.O., Derby.
PAXON, T. G., M.B. Lond.: M.O. i/c second mass-radiography unit, Middlesex.
ROSE, W. L., M.SC., M.B. Sheff.: pathologist, Clayton Hospital, Wakefield.
STREET, F. N., M.B. Sydney, F.R.C.S.: resident surgical officer, Hospital for Sick Children, Great Ormond Street, London.

Middlesex County Council Public Health Department:

Principal Asst. M.O.'s:
CARTER, SYDNEY, M.D., B.HY. Durh., D.P.H.
MACGREGOR, J. F., L.R.C.P.E., D.P.H.

Southend-on-Sea General Hospital:

HENDERSON, A. L., M.B. Glasg., D.M.R.: physician i/c department of radiotherapy.
PACKETT, KATHLEEN, M.B. Leeds, D.M.R.: director, department of diagnostic radiology.

Southlands Hospital, Shoreham-by-Sea:

GIBSON, R. E., M.B. Lond., D.A.: resident anæsthetist.
KENNEDY, D. P., M.B. N.U.I., F.R.C.S.I.: resident surgeon.
LAWLOR, MARY, F.R.C.S.E., M.R.C.O.G.: resident obstetrician and gynæcologist.

Colonial Service:

BRETT, ENID, L.R.C.P.E.: lady M.O., Nigeria.
BUCKLEY, T. W., M.B. Dubl.: travelling M.O., Sarawak.
BURGESS, R. C., M.B. St. And., D.P.H., D.T.M. & H.: senior nutrition officer, Malaya.
CHILTON, NOEL, B.A., D.M. Oxfd, D.T.M. & H.: senior M.O., Tanganyika.
DRUMMOND, R. G., M.B. Edin., D.P.H.: M.O.H., Tanganyika.
DRURY, G. D., M.R.C.S., D.T.M. & H., D.A.: senior M.O., labour department, Kenya.
FLEMING, A. M., M.C., M.B. Lond., D.T.M. & H.: senior M.O., Kenya.
GORRIE, G. M., M.B. Glasg.: M.O., Kenya.
LOWTHER, A. H., M.B. Brist., D.T.M. & H., D.O.M.S.: specialist, grade B, ophthalmologist, Malaya.
MACFIGGANS, ROBERT, M.B. Edin.: senior M.O., Kenya.
TONER, J. M., M.B. N.U.I.: M.O., Nigeria.
TURNER, H. N., M.B. Belf., D.T.M.: senior M.O., Kenya.

Births, Marriages, and Deaths

BIRTHS

BEVAN-JONES.—On Jan. 4, at Bangor, the wife of Dr. D. H. B. Bevan-Jones—a daughter.
BROOKS.—On Jan. 4, at Bath, the wife of Dr. David Hall Brooks—a daughter.
CUTHBERT.—On Dec. 30, at Spittal, Kärnten, Austria, the wife of Captain O. D. Cuthbert, R.A.M.C.—a son.
FRASER.—On Jan. 4, in London, the wife of Dr. Russell Fraser—a son.
GOFFE.—On Jan. 7, at Edgware, Middlesex, the wife of Dr. Alan Goffe—a son.
HAWES.—On Jan. 4, at Guildford, the wife of Dr. B. Hawes—a son.
HUGGILL.—On Jan. 5, at Worcester, the wife of Dr. Peter Huggill—a daughter.
JARRETT.—On Jan. 3, at Painswick, the wife of Dr. Richard Jarrett—a son.
MACBETH.—On Jan. 5, at Oxford, the wife of Mr. Ronald Macbeth, F.R.C.S.—a son.
MACKENZIE.—On Jan. 5, at Newcastle-upon-Tyne, the wife of Mr. Ian MacKenzie, F.R.C.S.E.—a daughter.
OWLES.—On Jan. 3, at Llandudno, the wife of Dr. W. H. Owles—a son.
POWELL.—On Jan. 6, the wife of Dr. B. W. Powell—a son.
STORMONT.—On Jan. 4, at Exeter, the wife of Dr. Alan Stormont—a son.
THOMPSON.—On Jan. 7, at Oldham, the wife of Dr. John Thompson—a daughter.

MARRIAGES

NELLEN—LAWRENCE.—On Jan. 7, in London, Maurice Nellen, M.R.C.P., to Rosa Lawrence.
TRUELOVE—DASHWOOD.—On Jan. 3, at Wootton, Woodstock, Leslie Truelove, B.M., to Rosamund Dashwood.

DEATHS

ANDRÉ.—On Jan. 5, James Edward Felix André, M.R.C.S., aged 83.
CHANDLER.—On Jan. 7, at Sidmouth, Francis William Chandler, M.B. Lond., aged 79.
COWIE.—On Jan. 5, at Bickley, Kent, William Cowie, M.A., M.B. Aberd., aged 76.
EALES.—On Jan. 5, at Torquay, George Young Eales, L.R.C.P.E., aged 88.
FELLOWS.—On Jan. 3, at Church Stretton, Frederick MacFarlane Fellows, M.B. Edin., F.R.C.S.E.
FIRTH.—On Jan. 9, Arthur Charles Douglas Firth, M.D. Camb., F.R.C.P.
GLEESON.—On Jan. 7, Dr. Olaf Gleeson.
JENNER.—On Jan. 7, at Petts Wood, Kent, Wesley John Jenner, M.D. Brux., F.R.C.S.E., aged 77.
LEISHMAN.—On Jan. 3, at Brechin, Thomas Arthur Leishman, M.D. Edin., J.P., aged 87.
POPERT.—On Jan. 5, at Southport, Adolphe Joseph Popert, M.R.C.S., aged 93.
STICH.—On Jan. 6, Alexander Benham Stich, M.B., B.SC. Glasg., A.R.I.C., aged 58.

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MEDIA OF HEALTH EDUCATION

CYRIL BIBBY
M.A., M.Sc., F.L.S.
From the College of S. Mark and S. John, London

THE days when health education was regarded as synonymous with the delivery of public lectures are, one hopes, gone for good. Educators now have at their disposal a whole battery of visual and aural aids with which to vary and enliven their teaching. Sometimes, however, they give the impression of being so embarrassed by this richness of media as to be incapable of exercising discrimination in their use. Pamphlets, posters, films, broadcasts and the like are simply tools, as are scalpels, scissors, syringes, and stethoscopes, and equally require using on the appropriate occasions and in the appropriate manners. It is therefore worth while to consider the various media of health education and their relevance and applicability to different situations.

Such consideration calls, first of all, for a recognition of the fact that there is not, as some enthusiasts would have us believe, anything unique about the methods of health education. Health education is merely one strand of the total educational weave and, for our present purpose, all that is required is to apply general educational principles to this particular field. Health education, as education generally, must provide assumptions about the way life is lived (e.g., that people keep themselves and their surroundings fairly clean), inculcate habits conducive to health (e.g., that of washing hands before touching food), impart information which will provide a rational basis for habits already and yet to be acquired (e.g., that pathogenic bacteria may be transferred from hands to food), encourage healthy attitudes (e.g., that of responsibility for the health of the community), and develop appreciations (e.g., that of cleanliness and health as æsthetically desirable). The common statement that health education during the first few years of life can only be along the lines of habit training, and that of older children and adults along that of factual instruction, is an over-simplification which amounts to an error. All five aspects of health education must be carried on at all stages of the educational process, albeit certain aspects are of greater importance and more easily dealt with at particular periods. In assessing the relative values of health education media, moreover, the five aspects all require consideration.

ENVIRONMENT

The most potent of all educational media is the environment. It is the type of house into which it is born and the type of parents and siblings in its family which provide the material upon which the infant, long before it can speak or understand speech, bases its assumptions about the way life is lived. It is the type of school building and the type of school teacher which mould later assumptions about desirable ways of life. It is the type of building in which clinics are held and the type of doctor and nurse in attendance which build assumptions about the nature of health services. Any scheme of health education must therefore give high priority to the improvement of our physical and human environments; for in so far as environment negates teaching, environment is likely to win. To take one small example: much money and more educational effort have been expended in persuading people to wash their hands after defæcating; yet, almost without exception, our public health authorities charge their citizens who visit public conveniences twopence to do the former after they have paid a penny to do the latter.

SPEECH

Of the more usually recognised teaching media, the spoken word is still supreme. Fine variations of tone and emotional content render possible not merely factual instruction but also the reorientation of listeners' attitudes; and the fact that the sensitive speaker reacts delicately to each nuance of the audience's response makes speech a tool of finesse which no material medium can approach. Many speakers, however, do not use this fine implement with the delicacy it deserves. Speech is, in engineering language, a multi-purpose precision tool; but, unless the speaker has a clearly defined purpose in mind, he will use it always as a sledge-hammer. If the purpose is persuasion, one technique is required; if the arousing of interest, another; if factual instruction, yet a third.

Speech as a medium of factual instruction, moreover, must be delicately adjusted to the particular audience. Those without educational training and experience usually tend, in occasional talks to children or the general public, to over-estimate grossly the amount of information which can be effectively absorbed in three-quarters of an hour. It is necessary to cut down one's message to the very bones and, indeed, preferably to one large bone on each occasion. The bone can be presented from many angles and illuminated by lights of many colours, but it must be one bone and not a whole bag of bones. Simplicity, specificity, and varied repetition are the keys to successful oral instruction. Those with medical or biological training usually need to be particularly on their guard in the matter of language. "Myopia" and "hypermetropia" are all very well in specialist journals, but they have no place in popular health education. We want to inculcate an understanding of living things, not a verbal facility with dead languages.

Another failing in much health teaching is that of irrelevance to social conditions. Apart altogether from the debatable point of its health validity, the common advice to take daily baths and to clean the teeth after each meal is, for most of the population, futile. In the ordinary working-class home a daily bath for each member of the family is impossible. Even if a bath and running hot water are available, the expense of heating has to be considered and, in any case, the revolution which such a practice would involve in family routine is altogether too great. As regards cleaning teeth, if most children can be got into the habit of brushing them regularly each night before going to bed, we are not doing too badly. A drill which is unrealistic in terms of the starting-point of present popular habits can succeed only in further divorcing what is said in health teaching from what is done in health practice.

The spoken word is most effective as an educational medium when it is not all from one mouth. No school teacher would dream of giving a half-hour lecture to his children, as visitors to schools often do. The effective lesson is one of question and answer and discussion, of continuous interplay between teacher and taught. This method has now fortunately spread outside the classroom; and discussion groups, brains trusts, and the like are playing a big part in the health education of the general public. Two other school techniques, however, have hardly yet penetrated adult education. Teachers know full well that oral instruction is most effective when combined with manual activity and, wherever possible, the health word is linked with the health deed; yet plans for the health education of the public rarely provide for the public to do anything. Teachers know, moreover, that much of their most effective education is done in casual conversation with their pupils; yet medical practitioners rarely use friendly chats with their patients as a means of health education. Bright posters in the waiting-room may be attractive, but wise words in the consulting-room would be more effective.

LEAFLETS AND PAMPHLETS

After the spoken word, the most widely used media of health education are leaflets and pamphlets. There is no reliable evidence about their value when broadcast at random, but there is a strong suspicion that it is very

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little. When there is a limited sum of money to be spent on health education, the purchase of masses of leaflets for general distribution is of doubtful priority. Relevant leaflets and pamphlets should be available to all attending public health meetings and exhibitions, but more good may come of a hundred sold at a penny each than of a thousand distributed gratis. Most people tend to read what they have paid for, whereas many regard what is free as worthless. This consideration does not apply to free distribution to certain people on certain occasions. After a lesson on the house-fly most children would read an attractively written leaflet on the protection of food and the disposal of garbage, and might build up a most valuable scrap-book from such free material. After an examination at the antenatal clinic, most women would read a simply written pamphlet on health during pregnancy. After discussing the matter with the mother, the health visitor might fruitfully leave a free booklet on the sex education of children. It is simply a question of choosing the occasion and the means of distribution in such a way as to increase the likelihood that recipients will value what they are given and read and digest it. Far too much public money is at present spent on providing work for street cleaners and paper aeroplanes for small boys.

POSTERS AND CHARTS

Somewhat similar considerations apply to the use of posters and charts. Great care must be exercised in deciding just how and when they are to be used, if they are to be of real value. A fairly clear distinction can be drawn between the public poster whose purpose is to draw attention to some matter of health importance, the more intimate poster whose purpose is to influence people's sentiment towards some aspect of health, and the instructional poster or chart whose purpose is to explain the relevant health facts to the minority already sufficiently interested to be willing to learn.

The first type, for effectiveness, must be so widespread as to be virtually unavoidable. Good examples of this are the enormous poster campaign on venereal disease during the late war and the similar campaign for diphtheria immunisation. But here a law of increasing return applies. A few scattered posters will be almost useless, lost among the advertisements for beer and purgatives. Only when the posters appear on nearly every hoarding are they effective. Anything much less than saturation is waste.

The second type of poster is exemplified by some of the components of the war-time "Fighting Fit" Exhibition. The man in pyjamas at the open window would, if displayed widely on the public hoardings, probably be taken as an advertisement for fabrics or perhaps for health salts. As part of an exhibition in a clinic or welfare room, however, it can carry out its intended function of influencing sentiment in favour of fresh air. In its proper setting its meaning is clear and its message effective; in an improper setting it may be positively misleading.

The third type of poster or chart is similarly valuable only in certain rather clearly defined circumstances—viz., with a viewer or viewers close enough to see it clearly, interested enough to study it, and with time to spare for careful examination. Outside the school and lecture-room such a concatenation of circumstances probably occurs most often in clinics and the waiting-rooms of surgeries. A great deal of most valuable health education could be carried out by the effective use of such opportunities. Instructional posters on the health of the mouth and teeth might well be displayed in the dentist's waiting-room; charts explaining how communicable diseases are spread in the doctor's; child-care charts in the infant-welfare clinic; and so on. If this is done, however, it is important to ensure that the display is carefully selected, kept scrupulously clean, and changed often. Nothing is more depressing than to see a clinic whose walls are plastered in posters put up at random as a means of decorating drab walls, and left up indefinitely until their dirty and dejected state negates their exhortation to cleanliness and vigour.

POPULAR PRESS

The popular press as a medium of health education is a virtually unknown factor. During the last few years almost astronomical sums have been spent in newspaper advertisement, especially about venereal disease and diphtheria immunisation, and it is very difficult to assess the return. It seems possible, however, that the same sums of money, if devoted to other media (perhaps especially to the mechanical toys discussed below), would have been better spent. At any rate it seems clear that nothing short of such vast sums will have much effect, except in the case of local newspapers, in which large display space can be bought cheaply. These local papers, moreover, provide other opportunities for health education. A single person who writes frequent letters to the editor on topical health matters can exert wide influence; and short news paragraphs about the activities of the local clinic, the local school medical service and so on, are also most effective. It generally seems that health education opportunities bought in newspapers must be bought dearly, while excellent free opportunities go a-begging.

FILMS

The health education media so far considered are all old and well established, but there are other more modern media whose potentialities have hardly been explored, and perhaps prime among these is the film. The great advantage of the film, apart from its unique ability to portray motion, is that it carries conviction, but this is also a great danger. The old comment "It must be true because I read it in the paper" is giving way to "It must be true because I saw it on the screen." Educationists must certainly regret such uncritical acceptance and strive to abolish it; but so long as it exists it might as well be used for desirable ends. In using it, however, the lesser end must never be allowed to obscure the greater, and the health propagandist who produces films which encourage unthinking acceptance has no right to the title of educator. Muscular bodies are dearly won at the cost of moronic minds.

Anyone who is familiar with the health films produced in Britain must be somewhat depressed by the general level of their technical quality. In part this is a matter of finance, for, though commercial producers may spend half a million pounds on a film, an educational organisation can rarely spare more than a thousand or two. Some of the films produced by the Ministry (now Central Office) of Information are, however, technically excellent. Examples are "Your Children's Eyes" and the other films in this series, which seem always to delight audiences. Yet still something of the old magic lantern attitude seems to cling about health education, and it is often assumed that a public used to the technical excellence of commercial films, the emotional appeal of commercial film stars, and the luxurious comfort of commercial cinemas, should flock to see inferior films of impersonal germs projected in uncomfortable and draughty halls.

Probably the best solution is to distinguish clearly between short sentiment-affecting films for the initially uninterested general public and longer instructional films for minority groups already interested and willing to observe actively rather than absorb passively. The short films are probably most effective when slipped into commercial programmes, and the longer films when used in illustration of lessons and lectures. The common practice of showing a mixed bag to mixed audiences is of doubtful value. There is also a strong body of competent opinion that, though the sentiment-affecting film must have a sound track, the instructional film may often preferably be silent. Certainly for some

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years to come most school projectors will still be silent, and the recent tendency to produce only sound films cuts out an enormous potential audience.

One point to which local health authorities might give consideration is the possibility of fixing up "film corners" in their clinics. By the use of a translucent screen it is possible to project an image of 3 or 4 sq. ft. which is clearly visible in daylight; and, if one of the assistants were to put on the same short film every half hour or so, changing the subject each week, the effect would probably be not only the health education of the mothers waiting but also greater attendance at the clinic.

The filmstrip, which before the war was little used in Britain, is now clearly set to take an important place in visual education. The cheapness and portability of the projector and strips, together with the fact that strips can so easily be made from personal and local materials, constitute a great attraction. Little skill is needed to operate the apparatus, and it could well be left in clinics and waiting-rooms for attenders to work for themselves. Health visitors might also, in some cases, be able to take a projector on their rounds and give five-minute showings in selected homes. Such possibilities are additional to the more obvious uses in schools, clubs, adult classes, and the like.

BROADCASTING

It is unnecessary to emphasise the enormous possibilities of radio in health education. Most homes have a wireless set, and many listen to the more serious programmes. Health education by radio must not, however, be too serious if it is to reach those who most need it. Very few speakers can give straight talks with wide popular appeal, but fortunately very few such speakers are needed, since one man may reach a million. In recent years we have seen the development of some excellent discussion programmes relating to various aspects of health, and dramatic presentation of health material has also produced some good programmes. Health educationists, whether teachers, youth leaders, nurses, doctors, or others, could make the value of such programmes much greater by obtaining advance advice about programme plans and drawing the attention of those whom they serve to what is forthcoming.

In America, with its scores of low-power local transmitters, radio is widely used by State and County Boards of Health for giving talks of local interest. In Britain, with its few high-power transmitters, nothing of this sort has been possible. One may reasonably hope, however, that it will not be many years before the frequency-modulation system of transmission is widely adopted, and we have enormous opportunities for such local initiative. Shall we be ready, or shall we miss the bus?

MECHANICAL TOYS

All the media so far concerned have already been used in varying degree and with varying success for health education, but the many other possibilities wait to be explored. Why should those ingenious and fascinating mechanical toys be left exclusively to the seaside promenade and the pin-table saloon? Could not the same machine which salaciously invites viewers to see "What happened on the wedding night" be adapted to show what happens when a child is inoculated against diphtheria? Could not the device which enables the required railway time-table to pop into view when the appropriate button is pressed be refitted with cards informative of different aspects of health? Would it be so very difficult to devise a quiz cabinet which lights up when the button showing the correct answer to some health query is pressed? One can imagine the enthusiasm with which citizens old and young would visit a "health arcade" planned on such lines in a busy shopping centre. Which local health authority, one wonders, will first fully exploit these exciting possibilities?

CHEMOTHERAPY AND PHARMACOLOGY OF AEROSPORIN

A SELECTIVE GRAM-NEGATIVE ANTIBIOTIC

GEORGE BROWNLEE, B.Sc. Glasg., Ph.D. Lond.
S. R. M. BUSHBY, M.Sc. Brist.

From the Wellcome Physiological Research Laboratories, Beckenham

'AEROSPORIN' is an antibiotic produced by an aerobic spore-bearing bacillus identified as *Bacillus aerosporus*. Ainsworth et al. (1947) have described the isolation of this organism from soil and air and noted its probable identity with *B. polymyxa*. They have devised a method for producing the antibiotic in half-strength broth containing sucrose or glucose with traces of manganese, and isolating it by adsorption to a suitable charcoal and by subsequent elution with

TABLE I—MINIMAL DILUTIONS OF AEROSPORIN AND STREPTOMYCIN INHIBITING GROWTH OF ORGANISMS

Organism	Strain	Minimal bactericidal dilution (µg. per ml.)	
		Aerosporin hydrochloride	Streptomycin
Bact. coli	CN348	0·08	16
Bact. coli	CN150	<0·04	16
Bact. coli	CN312*	0·08	16
Bact. coli	CN313*	0·08	62·5
Bact. coli	CN314*	0·16	16
S. typhi	CN512†	0·08	16
S. paratyphi A	CN164	<0·04	16
S. paratyphi B	CN166	0·08	8
S. typhi-murium	CN691	0·64	125
Salmonella sp. (Oranienburg type)	CN834	0·32	125
S. enteriditis	CN1048	0·64	8
Salmonella sp. (Hvittingfoss type)	CN1097	0·64	125
Salmonella sp. (Newport type)	CN865	0·16	62·5
Salmonella sp. (London type)	CN861	0·32	62·5
S. choleræ-suis	CN408	0·16	31·25
Salmonella sp. (Aberdeen type)	CN862	0·32	62·5
Bact. aerogenes	CN345	0·2	12·5
Past. pestis	NCTC144a	0·4	12·5
Past. boviseptica	CN1413	0·4	12·5
Sh. shigæ	CN191	0·08	4
Sh. flexneri	CN185	0·16	8
Sh. sonnei	CN188	0·16	4
H. pertussis	CN127	0·04	0·5
H. influenzæ	CN258	0·02	1
H. bronchisepticus	CN387	0·08	>16
V. choleræ	CN247	0·32	8
Br. abortus	CN214	1·6	1·6
Ps. pyocyanea	CN200	0·64	4
N. catarrhalis	CN118	0·08	1
Staph. aureus	CN491	>80	1
Strep. pyogenes group A	CN10	>80	2
Strep. agalactiæ „ B	CN140	80	4
Strep. fæcalis „ D	CN478	>80	31
Streptococcus „ F	CN475	>20	0·5
Streptococcus „ G	CN1790	10	2
Strep. viridans	CN13	>80	1
Strep. pneumoniæ type I	CN33	>20	2
Strep. pneumoniæ type III	CN37	>80	62
N. gonorrhœæ	CN120	>80	8
Myc. tuberculosis	Avian no. 4	>80	1
Myc. tuberculosis	Human H844	>80	15
Myc. tuberculosis	Bovine	>80	15
B. subtilis	CN787	40	16
Ery. rhusiopathiæ	CN905	>80	4
Bact. friedländeri	CN151	5	4
P. vulgaris	CN329	>80	31
P. morgani	CN1705	>80	31
C. diphtheriæ	CN302	10	1
C. pyogenes	Alexander	20	2
Cl. welchii	CN363	20	250
Pleuropneumonia-like organism	Human	>80	<25
Pleuropneumonia-like organism	Bovine	>80	<25
A. fumigatus	CN1232	>20	>250
T. mentagraphytes	..	>20	>250
Syn. racemosum	..	>20	>250
Monilia albicans	..	>20	>250

* Calf-scour † Rawlings

Organisms above the bold rule are more sensitive to aerosporin than to streptomycin, while those below are more sensitive to streptomycin than to aerosporin.

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aqueous acetone after treatment with sulphuric acid. Being basic the antibiotic is first eluted as the sulphate; it is further purified by conversion to the helianthate and then to the hydrochloride, which is amorphous and hygroscopic.

A chemotherapeutic study of this new antibiotic was summarised by Ainsworth et al. (loc. cit.). The material used included impure sulphate and "pure" hydrochloride. Throughout the present report the concentrations are stated in terms of aerosporin standard 1947, containing 10,000 "units" per mg. A convenient method of assay has been by a dilution technique using *Bact. coli* as the test organism. In one variant of the test the dilutions are read after about three hours' incubation at 37°C. Material containing 10,000 units per mg. may for practical purposes be considered to be the pure hydrochloride; but final claims of this kind are best withheld until the chemical and physical properties of the substance, and if possible the constitution of the molecule, are known. The preliminary observations of our colleague Mr. Tudor S. G. Jones, not yet published, have shown that leucine, threonine, and a third, unidentified basic amino-acid enter into the constitution of aerosporin.

Because aerosporin is selectively active against gram-negative bacilli, its chemotherapeutic properties have mainly been compared with those of streptomycin base. The streptomycin was from one source (Wellcome Foundation) and was that pharmacologically studied by Madigan et al. (1947).

IN-VITRO ANTIBACTERIAL ACTIVITY

The minimal dilutions of aerosporin and of streptomycin inhibiting the growth of small inocula of a wide range of organisms are given in table I. Nutrient broth was used as the culture medium except for hæmophilus and mycobacterium, for which blood-agar and modified Long's synthetic medium were used.

Aerosporin is more effective, weight for weight, than streptomycin in inhibiting the growth of the coli-typhoid-dysentery organisms, *V. choleræ*, *Ps. pyocyanea*, *Past. pestis*, *H. bronchisepticus*, and other organisms of the hæmophilus group, but has little or no effect on the remaining organisms investigated.

TABLE II—EFFICIENCY OF AEROSPORIN IN PROTECTING MICE AGAINST *S. typhi* COMPARED WITH STREPTOMYCIN, PENICILLIN, SULPHADIAZINE, AND A COMBINATION OF PENICILLIN AND SULPHADIAZINE. EACH GROUP RECEIVED 2 DOSES DAILY FOR FOUR DAYS

Drug	Single dose	No. of organisms	No. of mice	No. of mice surviving on day: 1	2	3	4	5	6	7	8	9	10	Av. survival time* (days)
Lethal control	—	5×10^8	10	0	0	0	0	0	0	0	0	0	0	0·0
,,	—	5×10^6	10	0	0	0	0	0	0	0	0	0	0	0·0
,,	—	5×10^3	10	9	7	5	5	4	4	4	4	4	4	5·0
Aerosporin	µg. 100	5×10^8	10	9	9	9	9	9	9	9	9	9	9	9·0
,,	75	5×10^8	10	7	7	7	7	7	7	7	7	7	7	7·0
,,	50	5×10^8	10	5	5	5	5	5	5	5	4	4	4	4·7
,,	25	5×10^8	10	0	0	0	0	0	0	0	0	0	0	0·0
Streptomycin	µg. 1250	5×10^8	10	10	7	3	0	0	0	0	0	0	0	2·0
,,	975	5×10^8	10	10	8	2	0	0	0	0	0	0	0	2·0
,,	625	5×10^8	10	8	4	0	0	0	0	0	0	0	0	1·2
,,	312	5×10^8	10	3	0	0	0	0	0	0	0	0	0	0·3
Penicillin	1000 units	5×10^8	10	0	0	0	0	0	0	0	0	0	0	0·0
Sulphadiazine	10 mg.	5×10^8	10	0	0	0	0	0	0	0	0	0	0	0·0
Penicillin and sulphadiazine	1000 units and 10 mg.	5×10^6	10	5	2	1	0	0	0	0	0	0	0	1·0

*Average survival time = $\frac{\text{No. of days survived by each mouse}}{\text{No. of mice in group}}$

TABLE III—COMPARISON OF AEROSPORIN WITH STREPTOMYCIN IN PROTECTING MICE AGAINST *Bact. coli*. EACH MOUSE RECEIVED 2 DOSES DAILY FOR FOUR DAYS

Drug	Single dose (µg.)	No. of organisms	No. of mice	No. of mice surviving on day: 1	2	3	4	5	6	7	8	9	10	Av. survival time (days)
Lethal control	—	5×10^8	6	1	0	0	0	0	0	0	0	0	0	0·2
,,	—	5×10^7	6	1	0	0	0	0	0	0	0	0	0	0·2
,,	—	5×10^6	6	2	2	1	0	0	0	0	0	0	0	1·5
,,	—	5×10^4	6	6	6	6	6	6	6	6	6	6	6	10
Aerosporin	100	5×10^8	6	5	4	4	4	4	4	4	4	4	4	6·8
,,	100	5×10^7	6	6	6	6	6	6	6	6	6	6	6	10
,,	50	5×10^8	6	6	5	5	5	5	5	5	5	5	5	8·5
,,	50	5×10^7	6	6	6	6	6	6	6	6	6	6	6	10
,,	25	5×10^8	6	2	2	2	0	0	0	0	0	0	0	1·5
,,	25	5×10^7	6	5	5	5	5	5	5	5	5	5	5	8·3
Streptomycin	1250	5×10^8	6	6	6	5	0	0	0	0	0	0	0	2·8
,,	1250	5×10^7	6	6	6	6	6	6	6	5	5	5	5	9·3
,,	625	5×10^8	6	5	5	5	3	2	2	2	2	2	2	4·5
,,	625	5×10^7	6	6	6	6	6	6	6	6	4	4	4	9·0
,,	312	5×10^8	6	6	6	6	4	4	4	4	4	4	4	7·6
,,	312	5×10^7	6	6	6	6	1	0	0	0	0	0	0	3·2

IN-VIVO ANTIBACTERIAL ACTIVITY

The chemotherapeutic worth of aerosporin was assessed in a side-by-side comparison with streptomycin, and sometimes other chemotherapeutic agents, in groups of mice infected with organisms ranging in in-vitro sensitivity from the most to the least (table VII). Injected subcutaneously twice daily the largest dose used was that which caused no acute deaths in infected mice. For aerosporin hydrochloride this was 100 µg., and for streptomycin base 1250 µg., per 20 g. mouse.

S. typhi.—Mice were infected intraperitoneally with 0·5 ml. of a suspension of Rawlings strain, containing 10,000 average lethal doses, in 5% mucin. This led to such an overwhelming infection in the control untreated animals that most of them died within six hours. The drugs were administered immediately after infection and again six hours later on the first day; during the subsequent three days injections were given at 9.30 A.M. and 5 P.M. A typical protocol of the experiments is reproduced in table II, in which the average survival time is calculated by adding together the number of days survived by each mouse and dividing the sum by the number of animals in the group. The superiority of aerosporin in protecting the infected mice is clearly shown in the group given eight doses of 100 µg. when compared with the failure to protect of eight doses of streptomycin each of 1250 µg. Penicillin, in similarly spaced doses each of 1000 I.U., and sulphadiazine 10 mg. were without effect, and when administered together they delayed death for only a day or so.

Bact. coli.—Except that the infecting dose was one of 100 average lethal doses of organisms suspended in mucin, the details of treatment and management were identical with those of the typhoid-infection experiment. The protocol of a typical experiment, reproduced in table III, shows the superiority of aerosporin over streptomycin to be similar to that in infections with *S. typhi*.

H. pertussis.—Attempts to infect mice with *H. pertussis* by intraperitoneal or intravenous inoculation yield such inconsistent results that the method is generally considered valueless. On the other hand, the intracerebral injection of a particular mouse-passaged strain (Kendrick et al. 1947) invariably produces a lethal infection. Groups of mice, infected with 0·05 ml. of a broth suspension containing 10^7 organisms washed from a 48-hour culture on Bordet-Gengou medium, and constituting about 10,000 average lethal doses, die consistently within four to seven days. With groups of such test animals the chemotherapeutic effects of aerosporin, streptomycin, penicillin, and sulphonamides were compared; the results (table IV) cover twenty-one days, during which survivors were recorded every third day. This table shows aerosporin to be more effective than the other agents. Five days' treatment with optimal doses of sulphonamides proved

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more effective than five days' treatment with streptomycin but less effective than a single day's treatment with sub-optimal doses of aerosporin. Complete protection was achieved with optimal doses of aerosporin given for three days; almost complete protection with half this dose for the same period; and nearly as effective protection with the optimal dose given for one day only. Penicillin did not influence the survival-rate.

H. influenzæ.—The strains of *H. influenzæ* at our disposal are not lethal to mice when injected intraperitoneally; injected intracerebrally the strains are variably lethal, and a satisfactory lethal titration could not be made. An assay, subject to the limitations imposed by this difficulty, is reported in table v, which shows that, when given twice a day, 100 μg. of aerosporin offers the same protection as 1250 μg. of streptomycin.

H. bronchisepticus.—The virulence of strains of *H. bronchisepticus* to mice is low; of the strain used, 500×10^6 organisms caused 100% mortality of infected animals, and a tenth of this dose caused less than 20% mortality. In groups of mice injected intraperitoneally with the large inoculum in 5% mucin suspension, 100 μg. of aerosporin given twice daily for four days afforded 100% protection, whereas similar treatment with 1250 μg. of streptomycin afforded protection only for the first two or three days (table vi).

S. typhi-murium.—The chemotherapeutic activity of aerosporin was compared with that of streptomycin at two levels of inoculum, 5×10^4 and 5×10^6 organisms, corresponding to

TABLE IV—EFFICIENCY OF AEROSPORIN IN PROTECTING MICE AGAINST *H. pertussis* COMPARED WITH STREPTOMYCIN, SULPHATHIAZOLE, AND SULPHADIAZINE. EACH MOUSE RECEIVED 2 DOSES DAILY FOR NUMBER OF DAYS SHOWN

Drug	Single dose	Duration of treatment (days)	No. of mice	No. of mice surviving on day: 1	4	7	10	13	16	19	21	Av. survival time (days)
Control	—	—	23	23	20	1	0	0	0	0	0	3·7
Aerosporin	μg.											
,,	100	3	18	18	18	18	18	18	18	18	18	21·0
,,	50	3	18	18	18	18	18	17	17	17	17	20·4
,,	25	3	10	10	10	10	9	8	8	8	8	18·5
,,	100	1	16	16	16	15	14	14	14	14	14	19·0
,,	50	1	11	11	11	10	7	7	5	5	5	14·2
,,	25	1	12	12	12	10	4	2	2	2	2	9·3
Streptomycin	μg.											
	1250	5	24	24	24	22	14	7	6	5	5	11·2
,,	625	5	17	17	17	9	5	1	1	1	1	7·1
,,	300	5	12	12	11	3	1	1	1	1	1	5·7
,,	1250	3	6	6	6	5	1	0	0	0	0	7·0
Sulphathiazole	mg.											
	10	12	28	28	28	28	28	28	25	21	18	19·0
,,	10	5	17	17	17	16	16	13	10	9	8	16·2
,,	10	3	6	6	5	2	2	2	0	0	0	6·5
,,	10	1	6	6	5	1	0	0	0	0	0	4·0
Sulphadiazine	mg.											
	10	12	12	12	12	11	11	11	11	10	7	20·5
,,	10	5	18	18	17	12	12	12	10	8	7	13·6
,,	10	3	12	12	11	8	8	7	6	5	5	13·1
,,	10	1	6	6	6	4	3	2	1	0	0	9·0

at least 100 and 10,000 average lethal doses of *S. typhi-murium* injected intraperitoneally in a saline suspension. Groups of 6 mice received aerosporin 50 or 100 μg. or streptomycin 625 or 1250 μg. twice daily for four days. In this dosage the two antibiotics proved equally ineffective.

Ps. pyocyanea.—Protection experiments were designed with groups of mice infected with 100 average lethal doses of *Ps. pyocyanea*, and an approximate single lethal dose of the organism suspended in 5% mucin and injected intraperitoneally. The experiment showed that aerosporin gives some protection but less than streptomycin.

Strep. pyogenes, Staph. aureus, Ery. rhusiopathiæ, and Strep. viridans.—Optimal doses of aerosporin did not protect groups of mice infected with several average lethal doses of these organisms.

ATTEMPT TO RELATE IN-VITRO TO IN-VIVO ACTIVITY

Table VII compares the in-vitro and in-vivo activities of aerosporin and streptomycin. The intensely selective

TABLE V—COMPARISON OF AEROSPORIN WITH STREPTOMYCIN IN PROTECTING MICE AGAINST *H. influenzæ*. EACH MOUSE RECEIVED 2 DOSES DAILY FOR NUMBER OF DAYS SHOWN

Drug	Single dose (μg.)	Duration of treatment (days)	No. of organisms	No. of mice	No. of mice surviving on day: 2	4	6	8	10	12	14	Av. survival time (days)
Lethal control	—	—	5×10^7	26	12	10	8	6	6	6	6	4·0
,,	—	—	5×10^5	36	28	21	17	14	14	14	14	6·8
,,	—	—	5×10^3	36	31	29	20	17	17	17	17	8·2
Aerosporin	100	5½	5×10^7	26	21	20	20	19	19	19	19	10·5
,,	50	5½	5×10^7	16	11	10	8	6	5	5	5	6·2
,,	100	3	5×10^7	20	13	13	13	12	12	12	12	8·7
,,	100	1	5×10^7	20	16	15	13	11	11	11	11	8·8
Streptomycin	1250	5½	5×10^7	26	25	23	23	21	17	16	16	10·9
,,	1250	3	5×10^7	20	16	15	15	11	11	11	11	9·0
,,	1250	1	5×10^7	20	15	9	8	7	7	7	7	6·0
,,	625	5½	5×10^7	16	14	13	9	9	9	9	9	9·0

gram-negative activity of aerosporin and its greater efficiency than streptomycin against this class will be noted. A clinical deduction which might be hazarded is that aerosporin may prove chemotherapeutic against organisms sensitive to in-vitro concentrations of about 0·1 μg. per ml.

DISTRIBUTION OF AEROSPORIN IN THE ANIMAL

Assay.—The concentration of aerosporin in serum may be followed by the method of serial dilution of the serum in a medium consisting of 1% phenol-red broth containing 50% horse serum and inoculated with *S. typhi* or with *Bact. coli*.

Since the presence of serum slightly lowers the in-vitro efficiency of aerosporin, it is important that the serum concentration should be kept constant. This is achieved by making the primary dilution of the test serum in broth which contains no serum. Minimal concentrations of aerosporin may be detected by keeping the inoculum of *S. typhi* small; a suitable inoculum is that corresponding to a final dilution of 10^{-6} of a 24-hour broth culture. So that this small inoculum may not be inhibited by high concentrations of a test serum, the test serum is heated for 30 min. at 56°C to inactivate complement. Read after eighteen hours' incubation at 37°C this test will detect 0·20 μg. per ml. of aerosporin. It is convenient to add penicillin 0·5 I.U. per ml. to the medium to inhibit possible gram-positive contaminants.

Estimates of aerosporin in the cells and in the plasma from the blood of a rabbit given aerosporin parenterally an hour earlier, and in the cells and plasma of human blood to which aerosporin was added in vitro eighteen hours earlier, showed that aerosporin remained in the plasma and did not enter the cells.

Concentrations of aerosporin in urine were estimated by a rapid test in which a large inoculum corresponding to a final dilution in broth of 10^{-2} of a 24-hour broth culture of *Bact. coli* was read after three hours' incubation at 37°C.

TABLE VI—COMPARISON OF AEROSPORIN WITH STREPTOMYCIN IN PROTECTING MICE AGAINST *B. bronchisepticus*. EACH MOUSE RECEIVED 2 DOSES DAILY FOR FOUR DAYS

Drug	Single dose (μg.)	No. of organisms	No. of mice	No. of mice surviving on day: 1	2	3	4	5	6	7	8	9	10	Av. survival time (days)
Lethal control	—	5×10^8	6	4	2	1	0	0	0	0	0	0	0	0·8
,,	—	5×10^7	6	6	6	6	6	6	5	5	5	5	5	9·2
Aerosporin	100	5×10^8	6	6	6	6	6	6	6	6	6	6	6	6·0
,,	50	5×10^7	6	6	6	6	6	6	6	6	5	4	4	9·2
Streptomycin	1250	5×10^8	6	6	6	3	0	0	0	0	0	0	0	2·5

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TABLE VII—CORRELATION OF IN-VITRO AND IN-VIVO ACTIVITY OF AEROSPORIN AND STREPTOMYCIN

Organisms	Minimal effective concentration (μg. per ml.)			
	In vitro		In vivo	
	Aerosporin	Streptomycin	Aerosporin	Streptomycin
H. pertussis	0·04	0·5	++++	+
H. influenzæ	0·02	1·0	+++	+++
S. typhi	0·08	16	++++	+
Bact. coli	0·08	16	+++	++
H. bronchisepticus	0·08	>16	++++	−
S. typhi-murium	0·60	125	+	+
Ery. rhusiopathiæ	>80	4	−	−
Strep. pyogenes	>80	2	−	+++
Staph. aureus	>50	1	−	+++

Parenteral Administration.—The concentrations of aerosporin in serum and urine after subcutaneous injection in man and the rabbit, and after intravenous injection in the rabbit are set out in table VIII. After subcutaneous injection aerosporin readily enters the blood-stream and is fairly rapidly lost; the rate of disappearance after intravenous injection is no greater. It cannot be detected in the urine, at least in a biologically active form, unless large quantities are injected, and even then only a small proportion of the injected quantity is detected. The renal threshold for the rabbit appears to be about 4 μg. per ml.

In rabbits under sodium-pentobarbital and ether anæsthesia no aerosporin could be detected in the bile collected from the cannulated common bile-duct for five hours after the injection of a large dose of aerosporin. The doses varied from 1 to 4 mg. per kg. and produced serum-aerosporin levels comparable with those of the non-anæsthetised animal.

Aerosporin could not be detected in the cerebrospinal fluid of rabbits at intervals of one hour, two hours, and four hours after the subcutaneous injection of 100 μg. per kg.

In adult man a dose of 0·1 mg. per kg. administered every four hours would apparently maintain therapeutic blood-aerosporin levels. The serum-aerosporin levels of children receiving 0·4 mg. per kg. every four hours, ranged from 0·2–0·8 μg. per ml. at the first hour to less than 0·2–0·4 μg. per ml. at the fourth hour.

Intrathecal Administration.—Eight hours after the intrathecal injection of 100 μg. into non-anæsthetised rabbits weighing 3 kg. aerosporin could still be detected in the cerebrospinal fluid; with a dose of 500 μg. it could be detected twenty-four hours later.

Administration by Mouth.—Aerosporin could not be detected in the blood or fæces of rabbits up to forty-eight hours after a single oral dose of 4 mg. per kg. In groups of mice maintained for a week on a diet containing a daily dose of 1 mg. of aerosporin estimates made towards the end of the course showed that about 1% of the aerosporin was being excreted in the fæces in an active form, the concentration being 10·0 μg. per g. of fæces. In spite of this low recovery the aerosporin had eliminated aerosporin-sensitive organisms from the gut, the fæcal flora now consisting solely of insensitive organisms.

The ease with which aerosporin becomes adsorbed may explain the low recovery; for, when aerosporin is added to semi-fluid fæces to give a concentration of 100 μg. per ml., only 25% of the substance can be detected immediately by a biological test, and six hours later the amount is as low as 5%.

MODE OF ACTION

Aerosporin is bactericidal. Time, number of organisms, and concentration of aerosporin bear a simple relationship one to the other. Since viable organisms are never present in a medium containing a sufficient concentration of aerosporin to prevent visible growth after twenty-four hours' incubation, the question of bacteriostasis does not appear to arise.

The presence of 50% serum has a slight effect on the action of aerosporin, revealed by observing the minimal concentration that inhibits a given inoculum—for example, in a typical test 0·07 μg. per ml. inhibited a culture of *S. typhi* in nutrient broth, but in the presence of 50% serum 0·13 μg. per ml. was necessary. Again, the speed at which aerosporin kills in neat serum is slower than in broth; thus, 1 μg. per ml. sterilised a broth suspension in a quarter of an hour but took eight to twenty-four hours in the presence of serum. The organisms do not have to be actively multiplying to be susceptible; they are equally susceptible in water and in broth.

No morphological changes were observed in organisms recovered from the peritoneum of animals undergoing successful chemotherapy with aerosporin, or in organisms growing in vitro in the presence of sublethal concentrations of aerosporin.

DEVELOPMENT OF RESISTANCE

Whether strains of *S. typhi* could be induced to develop resistance to aerosporin was the subject of in-vitro experiments. No significant alteration in sensitivity was found after 28 passages from fluid medium. Grown on a solid medium, however, the organism did develop resistance. For this purpose *S. typhi* was inoculated on to a series of broth-agar slopes containing twofold increasing concentrations of aerosporin and incubated for 24 hours. Subcultures were then made on a fresh series of tubes from the tube which contained the highest concentration on which growth took place. An identical experiment with streptomycin was made simultaneously. After 34 passages on aerosporin the resistance of *S. typhi* had increased, the minimal lethal concentration of aerosporin rising from 0·05 μg. to 3·0 μg. per ml., whereas after only 10 passages on streptomycin the minimal lethal concentration had increased from 7·5 μg. to more than 1250 μg. per ml. No cross-resistance was developed between the two resistant strains; the aerosporin-resistant organism was still sensitive to 12 μg. per ml. of streptomycin, and the streptomycin-resistant strain to 0·8 μg. per ml. of aerosporin. The organisms were still virulent to mice, and the resistance was present in vivo: mice infected

TABLE VIII—SERUM CONCENTRATION AND URINE RECOVERY OF AEROSPORIN AFTER PARENTERAL INJECTION IN MEN AND RABBITS

Time	Serum concentration (μg. per ml.)										
	In men		In rabbits								
	Subcutaneous dose (μg. per kg.)		Subcutaneous dose (μg. per kg.)						Intravenous dose (μg. per kg.)		
	100	100	500	500	800	800	2000	2000	800	800	1600
5 min.	..	..	..	..	..	..	..	..	8·0	8·0	8·0
30 min.	0·4	0·2	2·0	1	2	1·6	2·5	3·2	4·0	4·0	5·0
1 hr.	0·2	0·4	1·0	>2	2	0·8	5·0	1·6	2·0	2·0	5·0
2 hr.	0·2	0·2	1·0	2	1	0·8	0·8	1·6	0·8	0·8	5·0
3 hr.	0·2	0·2	0·4	1	0·4	0·8	0·4	0·4	0·8	0·8	1·6
4 hr.	0·2	0·2	0·4	1	0·4	0·4	0·4	0·2	0·4	0·4	0·8
6 hr.	<0·2	<0·2	<0·2	0·4	0·2	0·2	<0·2	<0·2	0·4	<0·2	..
Recovery in 24 hr. (%)	0	0	..	..	..	..	0·25	8	3	0	3
Hours when excreted	..	..	..	..	..	..	1st to 3rd	2nd to 4th	1st to 4th	..	1st to 3rd

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with the aerosporin-resistant strain were not protected by aerosporin but were protected to the same degree by streptomycin as those infected with the original strain; and mice infected with the streptomycin-resistant strain were protected by aerosporin but not by streptomycin.

TOXICITY

Acute Toxicity to Mice.—This was studied after the intravenous injection of several doses of aerosporin into groups of 10 mice, weighing 18–20 g. Toxic doses caused immediate symptoms consisting of vasoconstriction, muscular incoördination, and respiratory distress. At this stage stimulation of the central nervous system was shown by occasional strychnine-like convulsions. Complete flaccidity of skeletal muscles followed, with dyspnœa and apnœa. Arrest of the heart and death from anoxia followed in three or four minutes. In animals which recovered from near-lethal doses the curare-like effect on muscle was more in evidence and gave way to a phase of vasodilatation and ultimate recovery. That the terminal stage appeared to be due in part to paralysis of the intercostal muscles and diaphragm was suggested by observations made with the phrenic-nerve rat-diaphragm preparation of Bülbring (1946). Typical aerosporin concentrates of up to 90% "purity," added to the bath in concentrations of 2 mg. of aerosporin standard 1947 to 100 ml., paralysed the diaphragm; the effect was not reversed by prostigmine, but recovery followed after washing out the aerosporin.

The acute intravenous toxicities of several batches of aerosporin have been determined.

The slopes of the line relating the probits corresponding to the mortalities and the logarithms of the doses used are of the same order and show no artefact. The average lethal doses (L.D.50), derived graphically, approximate to each other when calculated in terms of aerosporin content and show a simple relation between aerosporin content and acute toxicity.

The average intravenous L.D.50 corresponds to 6·14 mg. of aerosporin standard 1947 per kg. and to a blood-aerosporin level of 30–40 μg. per ml. For comparison, the acute intravenous toxicity of streptomycin base is given variously as 80–300 mg. per kg. (Molitor et al. 1946) or 220 mg. per kg. for streptomycin I, and 100 mg. per kg. for streptomycin (unknown) (Madigan et al. 1947). Thus aerosporin is from fifteen to thirty times as acutely toxic as streptomycin. The average lethal dose of aerosporin after subcutaneous injection in mice is about 20 mg. per kg., death taking place one or two hours after injection.

Circulatory Effects.—In cats anæsthetised with pentobarbital sodium intraperitoneally traces of depressor and pressor substances were detected; 4 mg. equivalent of aerosporin standard 1947 had less depressor effect than had 0·5 μg. of histamine base.

Antidiuretic Effects.—The acute effect of aerosporin concentrates on water diuresis was studied in groups of 4 rats. Food, but not water, was withdrawn on the previous night, and in the morning 5 ml. of tap water per 100 g. of body-weight was given with a stomach-tube, and a dose equivalent to 5 mg. of aerosporin standard per kg. was given subcutaneously. Urine was measured hourly for six hours. All batches contained more or less of an antidiuretic principle when tested at this high dose level in a susceptible laboratory animal. The effect varied with the purity, and no batch has been entirely free from the contaminant. No antidiuretic effect was however observed in man with the therapeutic dosage used.

Kidney-damaging Factor.—All batches of aerosporin except one highly purified batch (203P) contained also a substance which damaged the renal tubules, causing albuminuria. The effect varied inversely with the purity. Purified material used for clinical trial has contained small amounts of this substance, which does not appear to be identical with the antidiuretic principle. Batch 203P was free from the kidney-damaging substance both by animal assay and by clinical observation in man.

Action on Blood-cells.—By the method of Dr. C. G. Paine (Abraham et al. 1941) it was found that a concentration of 100 μg. of aerosporin per ml. had no toxic effect on leucocytes after four hours; in a concentration of 1000 μg. of aerosporin per ml. the cells were alive but sluggish. In an observation made at the same time 1000 μg. equivalent of streptomycin base per ml. killed leucocytes in 30 min., and in the presence of 1000 I.U. of penicillin-sodium per ml. the activity was slightly reduced after four hours.

Aerosporin is not hæmolytic, since 125 μg. per ml. caused no hæmolysis of a 10% suspension of human red cells in physiological normal saline after twenty-four hours at 20°C.

DISCUSSION

This report is mainly concerned with the effectiveness of aerosporin in experimental infections with gram-negative bacteria, against which it has a highly selective action, and particular attention has been given to the infections in which established chemotherapy has hitherto been largely unsuccessful, perhaps the most important being pertussis and enteric fever. The evidence presented takes the form of in-vitro and in-vivo comparisons with streptomycin and occasionally other chemotherapeutic agents.

Impressive features of aerosporin which emerge from this study are its bactericidal power, reflected in the protection afforded to infected animals, and its reluctance to produce resistant strains. To mice infected experimentally with *H. pertussis* aerosporin gave more protection than streptomycin when the two antibiotics were administered in doses proportional to their in-vitro titres. The bactericidal nature of aerosporin is illustrated in the high protection afforded by only two doses, each of 100 μg., compared with the poor protection resulting from 1250 μg. of streptomycin given twice daily for five days. Again, the rapid elimination of the infection by aerosporin contrasts with the slighter protective action of the sulphonamides. Long treatment with large doses of sulphadiazine or sulphathiazole gives surprisingly good results but does not eradicate the infection, since deaths occur after treatment has stopped. Shorter treatment with sulphonamides emphasises the superiority of aerosporin. The chemotherapeutic activity of aerosporin against *H. pertussis* suggests that it may prove of value in whooping-cough, and the clinical trial in 10 cases reported by Swift (1948) supports this view.

S. typhi is more sensitive in vitro to aerosporin than to streptomycin, and in mice with an overwhelming infection, which led to the death of untreated controls within six hours and in which continued penicillin and sulphadiazine therapy was without effect, aerosporin produced higher survival-rates than streptomycin. Aerosporin may therefore be expected to exert a demonstrable effect in enteric fever.

The high activity of aerosporin in the test-tube against strains of *H. influenzæ*, and its equal efficiency with streptomycin in the treatment of intracerebral infections of mice, indicates that aerosporin may be at least as effective as streptomycin in *H. influenzæ* meningitis of man. Intrathecal injection in rabbits shows that aerosporin is well tolerated and that a therapeutic concentration in the cerebrospinal fluid may be maintained for twenty-four hours after a single dose.

Other infections of which the causal organisms are highly aerosporin-sensitive and may therefore be expected to respond to aerosporin are *Bact. coli* infections, paratyphoid fever, pasteurella and salmonella infections, bacillary dysentery, and, in the veterinary field,

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H. bronchisepticus infections of dogs and calf-scour of calves. Infections with *V. choleræ*, *Br. abortus*, and *Ps. pyocyanea* may also respond to aerosporin. Though treatment of experimental infections with the last organism was unsuccessful, it is sensitive in vitro to concentrations of aerosporin that can easily be maintained in man.

The fact that aerosporin exerts its bactericidal action at the same speed in broth and in water, together with the absence of observed morphological changes in bacteria submitted to sublethal doses, suggest that it acts by interfering with a system more immediately vital than reproduction. The bactericidal action of aerosporin takes place more slowly in serum than in broth and is influenced by the number of organisms present; these facts suggest that successful therapy may depend on the maintenance of continuous adequate serum levels; for man the suitable spacing of doses seems to be from three to four hours. On the other hand, the demonstration that twenty-four hours' treatment is effective in experimental pertussis infections may be worth following up clinically.

Aerosporin does not enter the blood-stream from the alimentary canal, and therefore it is useless to give it by mouth in systemic infections. Combined oral and parenteral administration may, however, prove most effective in intestinal infections, for aerosporin given by mouth eliminates the sensitive organisms from the gut.

Disadvantages of aerosporin therapy may be seen in the observations that the antibiotic is not excreted either in bile or in urine, at least not in a biologically active form. The available evidence indicates that we are dealing with a large molecule which does not pass the kidney barrier.

The difficulty with which a strain of *S. typhi* could be induced to develop resistance to aerosporin is a most significant feature. After 28 passages in a fluid medium there was no alteration in the sensitivity of the strain, and 34 passages on solid media were necessary to increase its resistance sixfold. Under identical conditions only 10 passages were necessary on solid streptomycin media to increase its resistance about two hundred times.

The acute intravenous toxicity of aerosporin of near chemical purity is 6·14 mg. per kg.—i.e., about thirty times as great as that of streptomycin base. However, this simple comparison is misleading, since in experimental infections with the organisms of pertussis and enteric fever aerosporin is so much more effective than streptomycin that the therapeutic index of aerosporin is actually higher. A more realistic therapeutic index can be obtained by relating the blood-aerosporin level corresponding to the minimal lethal dose (L.D.50) and the average therapeutically effective blood-level. Since the former averages 30–40 μg. per ml. and the latter 0·2–0·4 μg. per ml., there is an ample margin of safety.

SUMMARY

Aerosporin is a basic peptide produced by *B. aerosporus* (or *polymyxa*). A hydrochloride approaching chemical purity (aerosporin standard 1947), containing 10,000 "units" per mg., serves as the standard of reference.

Compared with streptomycin in the test-tube, aerosporin is more discriminating in its activity, which is restricted to several gram-negative pathogens, against which it is from ten to many hundred times more active than is streptomycin. It has no action against the tubercle bacillus.

In experimental infections in animals aerosporin gave complete protection against *H. pertussis* with elimination of the infection whereas streptomycin did not protect. Similar effects were demonstrated in experimental infections with *S. typhi*, *H. bronchisepticus*, and *Bact. coli*.

Aerosporin is not absorbed from the gut, from which it eliminates sensitive organisms. Given parenterally it disappears from the blood-stream quickly; hence four-hourly maintenance doses are necessary. In the normal animal it is not detected in cerebrospinal fluid, bile, or urine in a biologically active form. After a single intrathecal dose in the rabbit therapeutic concentrations persist for twenty-four hours.

Aerosporin is bactericidal. The time taken to kill depends on the number of organisms and the concentration of aerosporin present. Resistant strains are produced with difficulty.

Aerosporin is more acutely toxic than streptomycin; but in terms of intrinsic antibacterial efficiency their therapeutic indices are of the same order. The blood-aerosporin level corresponding to the minimal lethal intravenous dose (L.D.50) is at least 75 times greater than the average therapeutic blood-level. Aerosporin is non-hæmolytic and has about the same toxicity to leucocytes as penicillin.

Aerosporin concentrates are more or less contaminated with an antidiuretic principle and a substance which damages the renal tubules. Purified material is free from the second factor, and the first has not been shown to act in man.

ADDENDUM

After this paper had been prepared for publication, a report on 'Polymyxin' by Stansly et al. (1947) reached this country. Polymyxin, as described, is produced by the organism which produces aerosporin, and appears to have an identical antibacterial spectrum but to have only a fraction of the intrinsic efficiency of aerosporin. Whether polymyxin as described is impure aerosporin or is a different molecule remains to be discovered.

A prior report of the antibacterial nature of crude liquid cultures of *B. polymyxa* was presented by Benedict and Langlykke (1947) and anticipated by 3 days our description (Ainsworth et al. 1947) of the chemotherapeutic activity of relatively pure material.

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". . . There is too great an endorsement of exercise as a health-giving measure without proper attention to the condition of the person for which it is recommended. This is a particularly dangerous tendency because of the compulsory use of exercise not only in military forces but in our public schools. . . . Excluding injuries received in athletics, damage can be done by poorly supervised compulsory physical exercise given to large groups. This is more the case in schools than in military organisations. In the latter only young men (and now young women) who have been screened by a physical examination are subjected to regimented exercise. Medical observation of military personnel is usually continuous and rigid. In schools, where such supervision is often lacking, the child just coming down with an acute infection such as diphtheria or meningitis, or other serious acute conditions, may have their resistance lowered by physical exertion at this time to such a degree that what might have been a mere subclinical immunising infection may be converted into a severe case of the disease leading to death or crippling effects. . . . It is thus seen that physical exercise is not a matter to be dealt with lightly if the real object is to improve the state of health and physical efficiency. The age, sex, and physical condition must be a matter of careful and serious concern, particularly where group compulsory physical exercises are used."—Editorial, *Nav. med. Bull., Wash.* 1947, **47**, 1048.

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TREATMENT OF PERTUSSIS WITH AEROSPORIN

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'AEROSPORIN' is an antibiotic produced by strains of *Bacillus aerosporus* (or *B. polymyxa*), a widely distributed bacterium whose natural habitat appears to be the soil. Isolated by Ainsworth et al.[1] it was shown to be chemotherapeutic and selectively active against gram-negative pathogens. Chemotherapeutic and pharmacological studies[2] have demonstrated its ability completely to protect mice against lethal doses of *H. pertussis*. By reason of its bactericidal nature aerosporin in adequate dosage appears to be able to eliminate this pathogen, a finding which contrasts with the failure of streptomycin to protect animals against *H. pertussis* infection and with the limited efficacy of large and repeated doses of the sulphonamides.

The prompt and decisive action of aerosporin in experimental infections raised the hope that it might prove equally successful in the treatment of whooping-cough, and a small clinical trial was embarked on.

Dosage.—From the work of Brownlee and Bushby[2] it appeared that blood levels of 0·1–0·2 μg. per ml. were likely to prove chemotherapeutic and that a dose of 0·2–0·4 mg. per kg., in terms of aerosporin standard 1947, would maintain this level in man for four hours. The pharmacological evidence pointed to the presence of two impurities in the concentrates available for clinical trial—an antidiuretic factor seen in animals treated with large doses, and a factor which damaged the renal tubules, producing albuminuria in animals treated with therapeutic doses. Only batches containing minimal quantities of the albuminuria-producing factor were used; one batch (that used in case 10) was free from this impurity. For these reasons the first 3 patients received only 0·2 mg. per kg. four-hourly; but, since no toxic signs developed, the dosage was raised to 0·4 mg. per kg. four-hourly for mild and moderately severe cases. The observation that a very severe case did not respond to 0·5 mg. per kg. four-hourly but did respond to 0·8 mg. per kg. three-hourly led us to adopt 0·8 mg. per kg. four-hourly as the routine dosage. In 3 cases a three-hourly dose schedule was adopted as an alternative to an increase in dose. The course covered five days.

Materials.—The aerosporin was supplied in sterile sealed ampoules as a freeze-dried colourless hydrochloride containing the equivalent of 4 mg. of aerosporin standard 1947. The batches varied in purity from 70% to 80% and before reaching us had been tested for sterility and for freedom from pressor bases and histamine-like impurities.

Clinical Evaluation.—The progress of the disease was judged by observing prominent clinical features, such as the occurrence and intensity of postparoxysmal apnœa, vomiting, whooping, and temporary or permanent cyanosis. Frequent differential white-cell counts and estimations of erythrocyte-sedimentation rate, and weekly radiography of the chest were used as a guide to progress and to detect complications. In this report cases are described as *mild* when whooping alone was present, as *moderate* when whooping was associated with vomiting, as *severe* when whooping was associated with cyanosis, and as *very severe* when paroxysms were followed by an apnœic period and cyanosis was constantly present. In view of the possibility of renal tubular damage, due to the presence of an impurity, repeated observations of renal function were necessary. A record was made of fluid intake, urinary output, and daily weight, and the urine was examined chemically every day and microscopically less often. Blood-urea was estimated at the start of therapy and later if albuminuria appeared. Though *H. pertussis* was isolated in only 1 case, a lymphocytosis was observed in all cases.

1. Ainsworth, G. C., Brown, A. M., Brownlee, G. *Nature, Lond.* 1947, 160, 263.
2. Brownlee, G., Bushby, S. R. M. *Lancet*, Jan. 24, p. 127.

CASE-RECORDS

Case 1.—A girl, aged 14 months, weight 21 lb. 12 oz. Whooping began on April 12; mild disease, contact.

Treatment.—Aerosporin 2·1 mg. four-hourly intramuscularly from April 12 to 19 (seven days). After one hour blood-aerosporin levels were 0·4 μg. per ml.; after four hours 0·2 μg. per ml.

Result.—Whooping stopped in nine days from the start, cough disappeared in four weeks, and subsequent recovery was complete and uneventful.

Case 2.—A girl, aged 2 years, weight 22 lb. 14 oz. Whooping and vomiting began on March 29; moderately severe disease, contact, bacteriologically proved.

Treatment.—Aerosporin 2·1 mg. four-hourly intramuscularly from April 14 to 15 (one day), then 4·2 mg. four-hourly from April 16 to 20 (four days). After one hour blood levels were 0·8 μg. per ml.; after four hours 0·4 μg. per ml.

Result.—Vomiting stopped on April 17 and whooping on April 22. Radiogram showed consolidation of right lower lobe on April 8 which increased between April 22 and May 5; it had almost completely resolved by May 21. Uneventful recovery. Weight on discharge (June 5), 25 lb. 4 oz.

Case 3.—A boy, aged 2½ years, weight 32 lb. 8 oz. Whooping began on April 8, mild disease, contact.

Treatment.—Aerosporin 3·0 mg. four-hourly intramuscularly from April 14 to 15 (one day), and 6·0 mg. from April 16 to 20 (four days). Blood levels were 0·2 μg. per ml. after one hour and 0·2 μg. per ml. after four hours.

Result.—Vomiting stopped on April 18 and whooping on April 20. Symptoms subsided rapidly, and recovery was uneventful.

Case 4.—A boy, aged 1 month, weight 7 lb. 12 oz. Whooping began on April 23. Severe disease with continuous paroxysms and recurrent periods (60 sec.) of apnœa; general condition very bad.

Treatment.—Aerosporin 2·1 mg. four-hourly intramuscularly from April 25 to 26 (one day) and 2·1 mg. three-hourly from April 27 to 30 (four days).

Result.—Vomiting stopped on April 25 and apnœa on April 27; paroxysms stopped on May 7. Recovery was free from chest complications and was uneventful. Weight 8 lb. 8 oz. on May 22.

Case 5.—A girl, aged 6½ months, weight 12 lb. 12 oz. Whooping began on May 15. Moderately severe disease with a history of bronchopneumonia leading to consolidation at 3½ months.

Treatment.—Aerosporin 2·5 mg. four-hourly from May 15 to 18 (three days), and 3·4 mg. four-hourly on May 19 and 20 (two days). In addition, oral penicillin 150,000 I.U. daily from May 22 to 26. Blood levels were 0·4 μg. per ml. at one hour and 0·2 μg. per ml. at three hours.

Result.—Whooping stopped on May 21 and vomiting on May 19. No chest complications developed; recovery uneventful. Weight 13 lb. 12 oz. on July 18.

Case 6.—A boy, aged 5 months, weight 14 lb. 5 oz. Whooping began about May 28. Severe disease.

Treatment.—Aerosporin 3 mg. four-hourly from June 6 to 11 (five days). Blood levels were 0·4 μg. per ml. after one hour and 0·2 μg. per ml. after four hours.

Result.—Whooping stopped on June 10 and periods of paroxysms and apnœa rapidly became less frequent. No chest complications appeared, and recovery was uneventful. Weight was 19 lb. on Aug. 20.

Case 7.—A girl, aged 1 year 9 months, weight 16 lb. 11 oz. Whooping began on July 7. There was a history of measles one month previously, and radiogram on admission showed consolidation of right lower lobe. Paroxysms and vomiting were frequent.

Treatment.—Aerosporin 3 mg. four-hourly from July 21 to 26 (five days); blood levels were 0·4 μg. per ml. after one hour and 0·2 μg. per ml. after four hours. In addition penicillin 120,000 I.U. was given parenterally from July 21 to Aug. 5, and sulphadiazine 5 g. daily from Aug. 5 to 10.

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Result.—Vomiting and paroxysms stopped on July 26, but patient continued to lose condition. Vomiting without cough recurred on Aug 5, and patient became cachectic and died on Sept. 13.

Necropsy.—Multiple lung abscesses, principally in left lower lobe, from which cultures of coagulase-positive *Staph. aureus* were grown.

Case 8.—A boy, aged 3 months, weight 11 lb. 13 oz. Whooping began between July 15 and 21; very severe disease with paroxysms and cyanosis on July 23.

Treatment.—First course. Aerosporin 2·5 mg. four-hourly from July 23 to 24 (one day), and 3 mg. from July 24 to 28 (four days). In addition, penicillin 120,000 I.U. was given parenterally from July 29 to Aug. 4, and sulphadiazine 1·5 g. daily from Aug. 5 to 11.

Result.—No change could be attributed to the combined chemotherapy.

Treatment.—Second course. Aerosporin 4 mg. three-hourly from Aug. 7 to 12 (five days). Blood levels were 1·6 μg. per ml. at one hour and 0·8 μg. after three hours.

Result.—Cyanotic attacks stopped on Aug. 8 and general condition started to improve. Whooping, except for occasional paroxysms, ceased on Aug. 12, and temperature returned to normal on Aug. 15. A small area of collapse of the right upper lobe, with mottling in the left hilar area, seen on Aug. 18 had much diminished by Aug. 30. Weight 12 lb. 5 oz. on Aug. 30.

Case 9.—A girl, aged 2 months, weight 9 lb. 14 oz. Whooping began on Aug. 11. Disease of moderate severity.

Treatment.—Aerosporin 4 mg. four-hourly from Aug. 12 to 16 (five days).

Result.—Whooping decreased on Aug. 19 and stopped by Aug. 25. Temperature returned to normal by Aug. 21. Recovery uneventful. Weight 13 lb. 12 oz. on Sept. 7.

Case 10.—A boy, aged 7 weeks, weight 8 lb. 10 oz. Whooping began on Sept. 4. Very severe disease complicated by gastro-enteritis.

Treatment.—Aerosporin 4 mg. three-hourly from Sept. 18 to 23 (five days). Penicillin 100,000 I.U. had been administered during the previous eighteen hours. Blood levels were 1·6 μg. per ml. at one hour and 0·8 μg. after three hours.

Result.—Apnœa ceased on Sept. 19, cyanosis on Sept. 23, and vomiting and whooping on Sept. 25. Diarrhœa, present on admission and throughout, recurred with vomiting on Sept. 26, causing a total loss of 9 oz. in weight. The infant's condition deteriorated in spite of parenteral fluids, becoming cyanosed before death.

Necropsy.—Lungs normal except small area of collapse in the right lower lobe. Heart showed dilatation of the right auricle. Much dehydration. Histological study showed extensive stripping of intestinal epithelium.

CLINICAL APPRECIATION

Cases 1 and 3, contact cases from the hospital nursery, were early and mild, and their recovery was smooth and uneventful. Cases 2, 5, and 9, of moderate severity, were favourably influenced, even though in case 2 aerosporin was given late in the disease; paroxysms and vomiting rapidly subsided, and whooping ceased between the sixth and thirteenth day.

Case 2, though showing consolidation radiographically before treatment was started on the sixteenth day of whooping, made a rapid recovery with radiological clearing of the lungs. The rest of the patients (cases 4, 6, 7, 8, and 10) had severe or very severe pertussis. Cases 4 and 6, aged 1 month and 5 months, rapidly recovered, with disappearance of whooping on the fourth and thirteenth day. In case 4 death from apnœa seemed imminent, but the severity of the paroxysms appeared to be modified within the first twenty-four hours of treatment. In both of these cases expected chest complications did not materialise.

In case 8 the very severe disease did not appear to be modified by a first course of aerosporin or by penicillin. Within twenty-four hours of the start of a second course, which overlapped a course of sulphadiazine, there was immediate improvement. A small area of collapse of the upper lobe of the right lung, which appeared during the third week of the disease, persisted for a further month. No completely satisfactory explanation for the failure of the first course was discovered, but it is believed that the dose was too small.

In case 7 the disease was some fourteen days old on the child's admission and appeared to be a secondary invasion following an attack of measles a month previously. On admission there was radiological evidence of consolidation of the right lower lobe. Paroxysms, vomiting, and cough were controlled with aerosporin but reappeared when the course finished. This phase was not controlled by penicillin or sulphadiazine, and the child died a month later. Staphylococcal lung abscesses of long standing were the cause of death and provided a satisfactory explanation for the background.

Case 10, whose life was in danger on admission, was an infant of 7 weeks, with very severe disease complicated by gastro-enteritis. The alarming cyanosis, apnœa, and whooping rapidly disappeared, but the child remained weak with a paroxysmal cough. Diarrhœa, present throughout, increased, becoming associated with vomiting twelve days later. It was the opinion of all concerned that the pertussis was resolving and did not directly contribute to the death, which took place on the fifteenth day. This opinion was reinforced at necropsy, which demonstrated only a minimal area of collapse of the lower lobe of the lung.

TOXIC EFFECTS

The expected damage to renal tubules, first observed in the animal experiments and known to be due to a contaminating substance, took the form of a transient albuminuria. Observed in 9 of 10 patients it varied from a trace to 0·4 g. of albumin per 100 ml. In 7 of these it disappeared within a week; in another it persisted for ten days and was associated with a *Bact. coli* pyelitis. In case 8, where the child received two courses, the albuminuria disappeared within a week, reappeared with the second course, and again disappeared within a week. Finally, in case 10, albuminuria only appeared after the substitution, on the last day of the course, of an impure batch for a batch known to be free from the factor.

Gross hæmaturia was not observed; but, microscopically, red blood-cells were found in 4 cases, which also showed granular and hyaline casts. Pus cells were encountered in 3 female patients, in 2 of whom *Bact. coli* was isolated from the urine on culture.

Sugar and acetone appeared in the urine in 3 instances, together with the albuminuria, and persisted in 2 cases for a day and in 1 case for two days.

A temporary rise of temperature to 99–100°F, starting on the second day of aerosporin therapy and lasting two days or as long as aerosporin was given, developed in 7 cases (1, 2, 3, 4, 7, 8, and 10). In case 10 it was not observed on the four days during which pure material free from renal-tubule-damaging factor was given, but appeared after the impure material was given for a day.

No other toxic sign was seen.

DISCUSSION

The clinical material consisted of 10 unselected consecutive cases of pertussis, including early and late, mild and most severe, and 2 moribund cases. The causal organism was isolated in only 1 case.

The observations were restricted to the therapeutic effects of a single scheme of dosage, corresponding to a blood-aerosporin level of about 0·4 μg. per ml. for five days. Since Brownlee and Bushby [2] have shown that a single dose of aerosporin protects 90% of animals experimentally infected with many lethal doses of *H. pertussis*, our dosage may be unnecessarily large. This is a subject for further inquiry.

In most cases a therapeutic effect was observed within the first forty-eight hours, suggesting that the toxins

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of the causal organism were suppressed at the source. Vomiting, periods of apnœa, cyanosis, and the frequency of paroxysms were first modified; and, as might be expected from observation of the normal course of pertussis, whooping and cough were last to disappear. Cases in which treatment was begun within a week from the onset of whooping enjoyed an uncomplicated recovery irrespective of the severity of the disease or the age of the patient. When treatment was not begun until a week after the onset of whooping the effects appeared less favourable. A probable explanation for the difference lies in the presence or absence of secondary invaders in lung parenchyma. Not only is a greater extent of lung damage to be expected as a result of the secondary invasion, but also we must expect the resulting lesions to favour the establishment and survival of pathogenic bacteria.

The optimal therapeutic effect of aerosporin will, therefore, be expected to be exerted, as happened in this series, where treatment is started before secondary infection is present. Benefit can, however, be expected after secondary invasion, as in case 2. The results show that aerosporin alone is effective in whooping-cough, especially in early cases. It is nevertheless not reasonable to assume that aerosporin alone is the treatment of choice in late cases.

Of necessity material containing small known amounts of impurity were pressed into service; it is satisfactory that the minor manifestations of toxicity, such as albuminuria, microscopical hæmaturia, and glycosuria, seem to be attributable to these impurities.

SUMMARY

An unselected series of 10 cases of pertussis, in children aged 1 month to 2½ years, were treated with aerosporin in a dosage of 0·4 mg. intramuscularly four-hourly for mild infections and 0·8 mg. four-hourly or three-hourly for severe, continued for five days. Blood-aerosporin levels at the end of four hours with these dosages were 0·2 μg. and 0·4 μg. per ml. respectively.

All cases showed a definite response in the first forty-eight hours; the ultimate benefit obtained seemed to depend on the duration of symptoms before the start of treatment rather than on the severity of the disease or the patient's age.

It is suggested that early cases of pertussis, treated before secondary infection has taken place, may be expected to respond to aerosporin alone; whereas in late cases a combination of aerosporin and a sulphonamide may be more effective.

The mild toxic effects observed were associated with the presence of impurities.

Our thanks are due to Dr. J. F. Hackwood, medical superintendent of the County Hospital, Farnborough, and to the staff and nurses. The aerosporin hydrochloride was supplied by the Wellcome Foundation Ltd. The material is not yet in commercial supply.

"... Welfare advisers should bear in mind that very few people are born scoundrels. Many are simply misled by what they think a loophole in the complicated machinery of modern civilised life. Similarly, different people respond in different ways to the strain and stress of life and even the same people respond differently at various times and under different conditions. A gastric ulcer may mean a spur to a man to get over his disability and to work harder, yet may seem a good excuse for his fellow worker to do less work and have more free time by indulging in chronic invalidism. It is for the combined efforts of the welfare adviser and the medical officer to disentangle these results of modern civilised communal life, and to bring back on the right path those people who go astray, and on the other hand to help those who find conditions of life too hard when a sudden strain in the form of disease is put upon them."—Dr. V. C. MEDVEI in a lecture to welfare advisers.

FRACTURES OF THE MANDIBLE WITH ŒDEMA OF THE NECK AND TONGUE

THE EARLY TREATMENT

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THE treatment of mandibular fractures complicated by gross œdema of the neck involving the base of the tongue, epiglottis, and perilaryngeal structures calls for good anticipation and experience if fatalities are to be avoided and early union of bone fragments obtained. This type of case is very common among maxillofacial battle casualties and not rare among those due to accidents. The object is to splint the main fragments of bone as soon as possible and to ensure that the patient's airway is in no way endangered. In a personal series of over 800 cases of fractured mandible, more than half of which have been caused by high-velocity missiles, this complication has occurred in over 100 cases and has caused more anxiety than all other factors together.

The treatment of these cases, as with all maxillofacial cases, is best undertaken by a team. The surgeon is responsible for the more complicated surgery; the dental surgeon undertakes the more simple surgery round the jaws, and the bone fixation; and the anæsthetist, besides anæsthetising the patient, ensures that his airway is preserved both during and after the operation. In all cases discussed in this paper it was the anæsthetist who advised on the measures necessary to ensure an adequate airway, and all laryngotomies and tracheotomies were carried out by him or the surgeon.

ANATOMY

The dorsum of the tongue is made up chiefly of intrinsic muscles with a minimum of connective tissue and an excellent blood-supply from small arteries. Thus wounds in this part of the tongue cause comparatively little anxiety. Trauma and infection are localised, and the wounds heal with little or no trouble if properly treated.

The base of the tongue is made up of extrinsic muscles, the hyoglossus and the geniohyoglossus, and closely related to them are the mylohyoid and anterior belly of the digastric. These muscles are all ensheathed in fascia, with the lingual artery and its branches ascending among them from the hyoid on both sides. This ensheathing connective tissue forms various fascial planes, which are more or less continuous down the neck. This tissue is dense, so blood and pus force their way along the less resistant parts of it, and thus travel along the muscles instead of reaching the external or internal surface. Pus or extravasated blood from the tongue may therefore cause œdema of the tissues of the base of the tongue or neck at all levels.

The structures of the larynx are more or less enclosed in the unyielding thyroid cartilage; hence any œdema in this area will be liable to constrict the airway between the vocal cords. Similarly, œdema near the base of the epiglottis and arytenoids will tend to cause stenosis of the glottis.

PATHOLOGY

Three main conditions may cause œdema of the base of the tongue or perilaryngeal tissues: (1) post-traumatic œdema; (2) hæmorrhage from larger vessels; and (3) deep cellulitis.

(1) *Post-traumatic Œdema.*—Trauma of the perilaryngeal tissue leads to œdema, as does an inflammatory process in any part of the body. An inflammatory exudate escapes from the venules and capillaries and infiltrates the tissues over a large area. The œdema of the perilaryngeal tissues may involve the tissues of the larynx itself. It does not persist

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long and, in the absence of infection, usually disappears in 24–48 hours.

(2) *Hæmorrhage from Larger Vessels.*—This may be due to rupture, by the missile or a bone fragment, of any of the larger vessels of the neck or the tongue. Where there is much loss of tissue, hæmostasis may be obtained by ligating the bleeding artery. When there is little or no loss of tissue, this is difficult. There is a large extravasation of blood, which, if it cannot escape through the entrance or exit wound, will force its way along the fascial planes extending down the neck, causing the soft tissues to become hard and engorged, especially in the deep areas round the larynx. When the hæmorrhage is from the lingual artery or its main branches, the tongue becomes swollen and raised and may protrude out of the mouth (fig. 1), soon becoming indurated and covered with fur and debris. The floor of the mouth will become engorged with blood and raised even to the level of the tips of the teeth, and the plica fimbriata and plica sublingualis become extraordinarily prominent.

(3) *Deep Cellulitis of the Neck.*—This is a more delayed condition and may follow penetrating or perforating wounds of the base of the tongue that have received inadequate or delayed treatment. Infection may be carried into the wound by the missile itself or spread into it from the mouth, or the hæmatoma originally formed may break down and become septic. The tongue swells, as described above, but becomes hard and indented at the sides and below by the teeth, and the floor of the mouth and neck are swollen and indurated. The patient is in extreme pain and discomfort and may exhibit signs of grave toxæmia.

Œdema from any of these causes may involve the laryngeal tissues. Anteriorly, the epiglottis may become swollen, pressed back by the base of the tongue, and by curling over may occlude the vestibule of the larynx. Swelling may develop in and around the true and false vocal cords, reducing the opening between them to a fraction of its normal size. The cords readily go into spasm if further irritated by any stimulus such as results from blood or other matter reaching the glottis, or from attempts at laryngeal inhalation in too light a plane of anæsthesia.

TREATMENT

Anæsthesia.—The successful induction of anæsthesia in these patients calls for considerable skill on the part of the anæsthetist. If the œdema is confined to the base of the tongue, its size and hardness render laryngoscopy extremely difficult if not impossible. Apart from these mechanical difficulties in the insertion of the laryngoscope, inspection of the cords is often prevented by the folding back of the epiglottis. When the œdema extends to the laryngeal tissues, the patient when conscious may breathe between œdematous vocal cords, even though the opening is narrowed; but as soon as he loses consciousness the cords may close and remain in spasm. Attempts at intubation may also cause the hypersensitive œdematous vocal cords to go into spasm, provoked by the touch of the tip of the tube, especially if induction and intubation are carried out under 'Pentothal,' as is common practice.

Surgical Treatment.—Good dependent drainage must be provided and any hæmatomas evacuated. When the injury is caused by high-velocity missiles, foreign bodies may need to be removed and the wound cleaned and sutured.

Splintage.—If effective temporary fixation can be obtained merely by interfragmental stabilisation, the problem is relatively simple. Unfortunately in these cases the fracture lines are almost always multiple, and there is usually displacement or loss of bone; hence splinting the mandible against the solid maxilla is necessary to ensure stabilisation of the fragments in a good position.

The question is: When shall this fixation be applied? Should it be delayed until there is no risk of its impairing the airway, or should the intermaxillary fixation of main fragments be secured immediately and provision made by the surgeon or the anæsthetist for ensuring a safe airway?

DELAYED INTERMAXILLARY FIXATION

At the beginning of this series intermaxillary fixation was delayed until œdema had subsided whenever there was gross œdema of the base of the tongue and perilaryngeal tissues and it was feared that fixation might impair the airway.

At the primary operation within a few hours of the patient's arrival at the special centre he received limited surgical treatment under general anæsthesia, as mentioned above, and arrangements were made for the application of intermaxillary fixation when the œdema permitted. This usually consisted of putting sets of eyelets, arch wires, or separate Gunning splints in position and loosely connecting them with elastics or tie wires. As the œdema subsided, these were tightened until the fragments were stabilised against the solid maxilla, with the teeth held firmly in occlusion. At least, this was the aim. In practice, good reduction of fragments proved almost impossible without a further anæsthetic, owing to the comminution of bone, and the technique developed into waiting until the œdema had subsided and then reducing the fracture under a second general anæsthetic.

The technique had many disadvantages. The lack of fixation of bone fragments, especially in cases of extreme comminution, usually prolonged the infection. In some cases the drainage established was sufficient to allow the œdema to subside completely (case 1); but this was the exception rather than the rule, for usually the continuing infection caused the œdema to persist. During the period of waiting for its subsidence the patient was in extreme discomfort and pain owing to lack of fixation of the fragments and inhibition of deglutition, though the difficulty of providing a sufficient food intake was usually overcome by passing a gastric tube. The delay in immobilisation may have prejudiced the early bone union, and the second anæsthetic which was necessary was to be deplored.

Case 1.—Bilateral comminuted fracture of mandible (fig. 2) caused by high-velocity missile, with gross œdema of base of tongue, treated by delayed intermaxillary fixation, followed by good result.

The patient was wounded on July 23, 1944. The casualty-clearing station (C.C.S.) reported: "Condition fairly good. Unable to talk. Difficulty in breathing. Resuscitation given. Tongue swollen but controlled." At a general hospital a stitch was put through his tongue, he was given morphine, and his wound was dressed.

On July 24, at noon, he was referred to the maxillofacial surgical unit at another general hospital. His condition was

Fig. 1—Typical case of fractured mandible with gross œdema of base of tongue. Note swollen hæmorrhagic tongue protruding from mouth. Emergency tracheotomy had been done in forward area. Arrow indicates path of missile.

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then generally good. Perforating wound of the face, entrance right submandibular area, and exit left cheek. Missile had passed through mandible and molar region of both sides, causing a bilateral comminuted fracture. Tongue extremely swollen and hæmorrhagic. Breathing difficult.

Operation at 3 P.M. under endotracheal anæsthesia. Three pairs of eyelets were wired into position ready for inter-

Fig. 2—Case 1 before operation.

maxillary fixation when tongue would be less swollen. Track through base of tongue cleared of pieces of broken bone, teeth, and debris. After debridement of right angle of mandible and removal of loose bone and teeth from it, including an upper molar, drains were put up to lingual side of fractures on both sides into wound track through tongue. Exit wound loosely packed with flavine cream gauze. Sent back to ward with nasopharyngeal airway in position. Stitch through tongue. Nasopharyngeal airway removed at 10 P.M.

On the 26th the tongue was smaller but still large. The patient was breathing and speaking easily.

Operation under endotracheal anæsthesia. Anterior fragments wired, in correct occlusion with upper teeth, by tie wire between eyelets. Nasopharyngeal tube left in position, to be removed when the patient became conscious.

On the 27th the patient was comfortable and breathing normally and was evacuated to U.K. by air. The Plastic and Jaw Centre in U.K. reported, on Oct. 12, 1944, an uneventful recovery.

Comment.—The œdema in this case was chiefly due to the hæmatoma, though deep cellulitis was a possible sequel to this hæmatoma and wound track becoming infected. Good drainage was given at the original operation, the swelling of soft tissue rapidly subsided, and intermaxillary fixation was applied within two days. This early subsidence of the œdema was the exception rather than the rule.

Case 2.—Comminuted fracture of one side of the mandible (fig. 3) with a large hæmatoma of the tongue, treated by

Fig. 3—Case 2: (*a*) before operation; (*b*) after operation.

delayed intermaxillary fixation, although the œdema of the tongue had not subsided.

The patient was wounded on Aug. 14, 1944, at noon, and was evacuated at 6 P.M. next day to a field ambulance, and later to a C.C.S. and thence to a general hospital, where he was referred to the maxillofacial surgical unit.

On examination he had a comminuted fracture in the left lower molar area, with teeth fractured; lacerations and loss of mucosa of mouth and left side of tongue; very large hæmatoma of floor of mouth; entry wound in left cheek; no exit wound.

Operation at 8 P.M. under endotracheal anæsthesia. Three pairs of eyelets were applied, but tie wires were not fixed, owing to swelling of floor of mouth. Small foreign body and fragments of teeth were removed from left side of tongue deep in floor of the mouth. After debridement of fracture site and removal of loose bone, submental drains to fracture line and base of tongue to left of midline were inserted. Entry wound and inside of cheek were trimmed and sutured, and a stitch was put through tongue.

On Aug. 19 the tongue was still very large, but it was considered that fixation was necessary before the œdema had subsided.

Operation under endotracheal anæsthesia. Fracture reduced, drains irrigated, and jaws fixed together. Tongue still larger than normal. The patient sent back to ward with endotracheal tube in place.

Six hours later he was found dead from asphyxia, having pulled out his tube, which was still in his hand. He had been seen alive five minutes before. He was reintubated and given cardiac massage, without success.

Comment.—This was the only death from asphyxia when an endotracheal tube had been left in place. Tubes were later secured against accidental or deliberate displacement by a tape passed through a safety-pin in the end of the tube and tied behind the occiput, and a label was attached containing instructions to the ward staff regarding the removal of the tube. This is essential under field-hospital conditions.

In case 3 treatment was begun with a view to delayed fixation, but dangerous respiratory complications developed. It was as a result of several similar cases that this technique was discontinued.

Case 3.—Comminuted fractured mandible and large hæmatoma of base of tongue. The patient reached a C.C.S. on Oct. 4, 1944, a general hospital on the 5th, and another general hospital on the 6th, when he was referred at 8.30 A.M. to the maxillofacial surgical unit.

On examination he had a perforating wound, entering through left cheek and passing through left mandible in the first molar area, base of tongue, and out through right submandibular region, causing fracture of mandible in left molar area, and a large hæmatoma in floor of mouth.

Operation at 10 A.M. under pentothal-oxygen-ether by nasal endotracheal route. Large hæmatoma evacuated from base of tongue; considerable hæmorrhage started, probably from the lingual artery, so exit wound packed. Submandibular drain inserted lingually to mandibular fracture. Pins inserted into anterior and posterior fragments. Fracture reduced, and bar locking pins applied. Three pairs of eyelets put on, but not used for intermaxillary fixation because tongue was very swollen. The patient was returned to ward with nasopharyngeal airway in position.

Nasopharyngeal airway removed at noon. At 2 P.M. the patient was having considerable difficulty in breathing. Cords found to be very œdematous. Endotracheal tube passed for airway in ward. At 10 P.M. tube was removed by ward medical officer, and patient was immediately asphyxiated by spasm of vocal cords.

Emergency laryngotomy under pentothal 1·0 g. Packing of right exit wound removed, and drain inserted up to base of tongue. Considerable amount of fluid evacuated. Intermaxillary fixation and mandibular fragments replaced by adjusting extraoral bar between pins. Low tracheotomy performed and laryngotomy tube removed.

The patient was evacuated on Oct. 9; the tracheotomy tube had probably been removed before this.

Comment.—If in this case the tracheotomy had been performed at the first operation, the primary treatment could have been completed and the two dangerous episodes avoided. This case illustrates (1) the inadequacy of nasal airways when there is serious œdema of the larynx; and (2) the danger of ward personnel insufficient in numbers or inexperienced in these special cases.

IMMEDIATE INTERMAXILLARY FIXATION

After many cases had been treated by delayed intermaxillary fixation, the conclusion reached was that, in most cases, the œdema of the tongue did not subside until intermaxillary fixation had been provided, and, since to do this successfully necessitated a second anæsthetic, with its attendant risks in view of persistent œdema, it would have been preferable to apply immediate fixation of the jaws and at the same time make provision for a reliable airway. This conclusion was supported by treating with immediate intermaxillary fixation several cases which had had tracheotomies performed in forward areas.

The original technique was therefore gradually discarded in favour of immediate intermaxillary fixation, safe airways being guaranteed either by leaving an endotracheal airway in position until the patient recovered control of his own airway, or by performing a tracheotomy at the beginning or the end of the operation. This technique has few disadvantages and the following advantages:

(1) Healing of tissues can proceed with infection controlled by all tissues being stabilised and drained. The œdema

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rapidly subsides, and a normal airway is usually established in 24–48 hours.

(2) No special postoperative supervision is necessary, and the immediate postoperative period is free from anxiety. This is very important, as supervision of any kind is difficult when many casualties are arriving.

(3) No second anæsthetic is required within a short period of the first, solely to obtain reduction of fragments, thus reducing the risk of postoperative chest complications.

The airway was maintained with an endotracheal tube left in position at the end of the operation in those cases in which the œdema was confined to the base of the tongue and perilaryngeal structures, and it was anticipated that voluntary control of the airway would return with consciousness. The tube was removed when the patient became conscious. Later in the series, as described above, precautions were taken against its premature removal. Case 4 illustrates the use of this technique.

Case 4.—Unilateral comminuted fracture of mandible (fig. 4) complicated by œdema of epiglottis, treated by immediate intermaxillary fixation and maintenance of airway with endotracheal tube.

The patient was wounded on April 3, 1945. At the field dressing-station he was coughing up blood; condition fair; aphasic. Transfused with 2 pints blood, 1 pint plasma. Next day he was evacuated to a general hospital and referred to the maxillofacial surgical unit.

On examination there was a through-and-through wound, entrance in right parotid region, comminuting right mandible molar region, through right tonsil, and exit below and behind left angle of jaw. Exit and entrance wounds were both very small. Right parotid region very swollen. Considerable œdema of epiglottis. Difficulty in swallowing and some difficulty in breathing. No radiography possible, but last two left lower molars thought to be involved, as they were very loose.

Operation under 1% intravenous bromethol, followed by N_2O and oxygen. The patient was given a pint of blood during operation. Last two left lower molars were extracted, and mucosa sutured over sockets. Tonsil wound left open. Drain inserted up to base of tongue right and left and up to fractured bone. Penicillin tube sutured into entrance wound. Intermaxillary fixation by tie wires on German arch wires. Main fragments immobilised by single extraoral 3 mm. screw pins with connecting bar. Endotracheal tube left in at end of operation. Local penicillin 500 units per ml. 36-hourly prescribed. Endotracheal tube removed when patient was conscious. Airway fair.

On April 5 the patient was more comfortable, and airway good. On the 6th the left drain was removed. Radiography

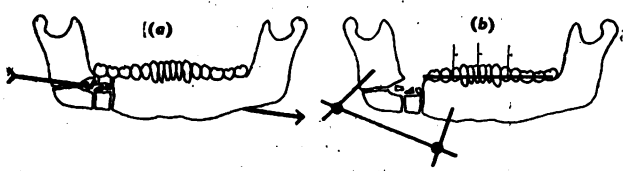

Fig. 4—Case 4: (a) before operation; (b) after operation.

showed satisfactory position of posterior fragment. On the 8th penicillin tube and right drain were removed. Pins clear and firm. Fixation good. The patient was evacuated by air to U.K.

Comment.—This case was typical of many. The penicillin locally may have contributed to the rapid subsidence of the œdema; but, even when this was not given, the immediate immobilisation of the tissues was sufficient for this in other cases.

A tracheotomy was performed when it was anticipated that there would be no reasonable chance of voluntary control of the airway when consciousness returned—i.e., in cases with gross œdema of the laryngeal structures. It was performed either at the beginning or the end of the operation. The technique was practised on about 25 occasions. It is a comparatively simple operation and was not subsequently regretted in a single case.

A preliminary tracheotomy under local anæsthesia was sometimes performed by the surgeon or the anæsthetist in cases which appeared to present unusual difficulties, and this undoubtedly conferred the highest degree of protection against accident. The intubation of the larynx sometimes proved mechanically impossible, even when the patient was fully anæsthetised, and an emergency tracheotomy was then necessary. In other cases acute asphyxia gave time only for a laryngotomy, replaced later by a tracheotomy. When the tracheotomy (or laryngotomy) had been performed at the beginning of the operation, the anæsthetic was administered through a sterile endotracheal tube passed through the incision.

The tracheotomy tube was well tolerated by the patient, plugged when it was thought that the normal airway was sufficient, and withdrawn twenty-four hours after plugging if the patient had no respiratory embarrassment. The incision closed quickly and, because of the early withdrawal, caused no permanent effect on the patient's speech. Case 5 illustrates the technique.

Case 5.—Comminuted fracture of left ramus and angle of mandible (fig. 5) complicated by gross œdema of the larynx, treated by immediate intermaxillary fixation and tracheotomy.

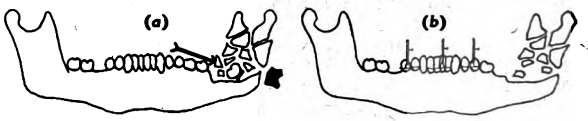

Fig. 5—Case 5: (a) before operation; (b) after operation.

The patient was wounded at 1 A.M. on Aug. 20, 1944, and referred to the maxillofacial surgical unit.

Examination showed a penetrating wound of left cheek, missile striking last left lower molar and causing comminuted fracture of ramus and angle of left side of mandible. All fragments in good position and none detached. Foreign body in situ. Respiration difficult.

Operation at 3 P.M. under pentothal 0·45 mg., cyclopropane-oxygen, ether-oxygen, by endotracheal route. Roots of the last two left lower molars were removed, and a dependent submandibular drain was inserted to the lingual side of fracture line. Entry wound sutured. Intermaxillary fixation by three pairs of eyelets and double tie wires. Laryngoscopy revealed gross œdema of glottis and secondary tissues, so tracheotomy was performed at end of operation. Tracheotomy tube was plugged on the 22nd and removed on the 23rd.

On the 24th, his condition being satisfactory, the patient was evacuated to U.K. by air.

Comment.—This case is again typical of many. In practically every case the tracheotomy tube was removed within a few days; meanwhile the patient's airway was ensured without constant supervision—an important provision under field conditions.

SUMMARY

Techniques used in the treatment of a large series of fractured mandibles complicated by gross œdema of the base of the tongue and perilaryngeal structures are described.

The original technique, in which fixation of the bone fragments was not applied until the œdema subsided, was discarded in favour of immediate immobilisation, a postoperative airway being provided by an endotracheal or tracheotomy tube, according to the degree of œdema.

Most of the cases of this type of injury treated had no complications; but the cases described have been specially chosen to show the importance of making a correct decision at the first operation on the technique to be adopted, bearing in mind that it is exceptional to have constant postoperative supervision for a patient in a military hospital near a battle area, where most of these cases are encountered.

I wish to thank my fellow members of the maxillofacial unit, Major G. M. FitzGibbon and Major T. Gibson, R.A.M.C., and Major L. M. Irwin, A.D. Corps, and especially Major H. L. Thornton, R.A.M.C., anæsthetist in more than half the cases discussed, who, with Major Gibson, gave me valuable suggestions in the writing of this paper.

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PERFORATION OF THE COLON IN DYSENTERY

TWO CASES OF RECOVERY AFTER OPERATION

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PERFORATION of the bowel is a comparatively rare complication of dysentery, but when it does occur it is almost invariably fatal. Very few cases successfully operated on seem to have been reported. The two operations for perforation of the colon in dysentery described below, one being an amœbic case and the other bacillary, were both successful.

CASE-RECORDS

Case 1.—A sweeper in the Indian Army, aged 22, was admitted to hospital on Jan. 28, 1944. The clinical picture was that of acute appendicitis of a little over fifty hours' duration, with pain, tenderness, and rigidity in the right lower abdomen, vomiting and constipation on the day of admission, coated tongue, temperature 100·6°F, and pulse-rate 96 per min. Before admission his bowels had acted normally, with no symptoms indicating a past or present dysenteric infection.

Operation.—The abdomen was opened by an oblique muscle-cutting incision in the right lower abdomen. The appendix was normal; but a swollen and indurated area was palpated in the retrocæcal tissues. The peritoneum below and to the outer side of the cæcum was divided, and a retro-cæcal abscess was opened, which contained foul-smelling pus and fæcal material. A finger was inserted, and a perforation of the posterior wall of the cæcum was readily felt. The cæcum was further mobilised, and an attempt was made to suture the perforation, but this failed because of the extreme friability of the bowel wall.

Since a perforation in this situation could not simply be brought to the surface and converted into a cæcostomy, and since drainage through either the peritoneal cavity or the loin seemed likely to lead to an intraperitoneal or retro-peritoneal spread of infection, it was decided to perform a colectomy. The incision was enlarged towards the flank, up to the costal margin, and a right hemicolectomy was performed. The terminal ileum and transverse colon were healthy, and the resection was completed by closure of the bowel ends and side-to-side anastomosis. Sulphanilamide powder, 10 g. in saline, was introduced, and the abdomen was closed with drainage.

Pathological Findings.—When the cæcum and ascending colon were opened, two ulcers were seen close together on the posterior wall at the level of the ileocæcal valve. One was about $^1/_4$ in. in diameter, the other $^1/_8$ in. × $^1/_4$ in. The larger one had perforated the whole thickness of the bowel. The wall of the cæcum and of the proximal portion of the ascending colon was thickened, inflamed, and œdematous. Above this the colon appeared normal.

A section from the edge of one of the ulcers was later reported on as follows: "This perforation is of acute type and is associated with the presence of a suppurative inflammatory exudate in the peritoneal coat. *Entamœbæ histolyticæ* (vegetative form) are present in the exudate adjacent to the site of perforation."

Progress.—Convalescence was uneventful, and the laparotomy incision healed by first intention except for a small area where the drainage-tube had been. Emetine gr. 1 was given daily for twelve days after operation. Three weeks after operation a sigmoidoscopy revealed no abnormality in the rectum or lower sigmoid. The stools, however, were found to contain *E. histolytica* cysts. This condition proved resistant to treatment; and in spite of emetine and quinoxyl enemas the passage of cysts continued.

Subsequently a large hernia developed at the site of incision, and the patient came under my care again nine months later. A satisfactory repair was performed.

Comment.—Possibly the most interesting feature of this case was the absence of any symptoms of active dysentery. Acton and Knowles[1] have noted that ulceration of the bowel may be present in apparently healthy amœbic carriers. In this patient ulceration apparently not only developed but also proceeded to perforation without producing any symptoms of dysentery.

Colectomy can only rarely be indicated in cases of dysenteric perforation. It should be possible to treat most cases by extraperitoneal drainage, exteriorisation of the perforation, or suture. When none of these procedures is practicable, however, colectomy may sometimes offer most hope of success.

It is interesting to speculate whether the presence of *E. histolytica* in the postoperative drainage contributed to the development of the hernia. It seems possible that amœbic infection interfered with the healing of the deeper layers of the abdominal wall, but that the course of emetine arrested the destructive process before the skin was affected.

Case 2.*—A clerk in the Indian Army, aged 20, was admitted to hospital on June 2, 1944, with fever of one day's duration. His temperature remained at 100–103°F, and on the fourth day acute symptoms of dysentery appeared: severe griping abdominal pain, quickly followed by frequent watery stools containing mucus and blood. The stool showed a bacillary exudate, and Flexner's bacillus was cultured.

Response to sulphapyridine gr. 1 four-hourly was satisfactory. Within twenty-four hours the patient's stools became less frequent, his temperature fell almost to normal, and his general condition improved.

On the fourth day of treatment (June 9) the patient became acutely ill, with a rise of temperature and abdominal pain. A few hours later there were signs of general peritonitis: slight abdominal distension, extreme tenderness, and silence on auscultation. His general condition was extremely poor, with a rapid thready pulse and cold clammy hands. His body, however, was burning hot, and the rectal temperature 107·6°F. This was during the hottest time of the year in a hot station in India, and the patient had clearly developed heat-stroke besides peritonitis. There was little hope of his recovery, but the hyperpyrexia was treated by placing him under a fan and covering him with cloths soaked in iced water, and the peritonitis with glucose-saline by intravenous drip, morphine, and withholding everything by mouth.

Within a few hours his temperature was reduced to normal, and next day both his general condition and his abdominal condition had improved considerably. A few days later there was no abdominal pain, distension, or tenderness, his temperature and pulse were normal, and all diarrhœa had ceased.

On the morning of June 14, five days after general peritonitis had been diagnosed, the patient again had abdominal pain. This was later followed by signs of small-intestine obstruction: colicky pain, vomiting, slight distension, and a just distinguishable ladder-pattern of distended small intestine. His temperature, which had risen the previous evening, was now 103·2°F and his pulse-rate 124 per min. Immediate operation was decided on, after first starting a glucose-saline intravenous drip.

Operation.—The abdomen was opened by a low right paramedian incision. The greater omentum was adherent to the anterior abdominal wall, and beneath it could be seen distended small intestine. A finger was introduced towards the pelvis, adhesions (of recent origin) separating easily, and a large abscess cavity opened without opening into any part of the peritoneal cavity not obliterated by the recently formed adhesions. The abscess contained much fæcal-smelling gas under pressure and little else. A large drainage-tube was introduced and the incision closed.

Progress.—After operation there was no further colicky abdominal pain or vomiting. The patient's general condition, at first very poor, gradually improved, and the intravenous glucose-saline was discontinued after four days. The abdominal distension did not subside until the third day, when fæces began to come through the drainage-tube. A fæcal fistula remained for nine days. Microscopical examination and culture of fæces did not now reveal any dysenteric

1. Acton, H. W., Knowles, R. On the Dysenteries of India. Calcutta, 1928; p. 34.

* The description of this case has been written in conjunction with Major Inder Singh, I.A.M.C., medical specialist at the hospital, under whose care the patient at first was.

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organisms. The temperature remained raised for seven days owing to infection of the laparotomy incision. Subsequent progress was rapid; and the patient was discharged from hospital just over two months after operation.

Comment.—Though a perforation of the colon was not actually seen in this case, the presence of much fæcal-smelling gas in the pelvic abscess, besides the development of a fæcal fistula, indicates that a perforation was present.

The finding of widespread recently formed adhesions at operation confirmed that general peritonitis had been present some days earlier. A perforation cannot have been present at that time, since it would then have been scarcely possible for the condition to have settled down as it did. Local peritonitis without perforation occurs not uncommonly in dysentery; and general peritonitis without perforation was found by Rogers [2] at necropsy in a fatal case of acute amœbic dysentery. In the present case this condition seems to have developed in acute bacillary dysentery.

What probably happened subsequently is that, after the dysentery infection had been overcome, a thinned area of ulcerated bowel wall gave way. Because of adhesions caused by the recent general peritonitis a localised abscess formed. This rapidly became distended with gas from the colon and produced a small-intestine obstruction, presumably due to the coils of adherent intestine becoming kinked as the abscess distended.

SUMMARY

Two cases of perforation in dysentery recovered after operation; one was an amœbic case, treated by colectomy, and the other a Flexner's bacillus infection treated by drainage of a pelvic abscess.

I am indebted to Colonel W. R. Rees-Williams, I.M.S., and Lieut.-Colonel A. J. D'Souza, I.M.S., officers commanding the hospitals in which these cases were treated, for permission to publish the case-records; to Major S. McDonald, R.A.M.C., for the report on the section in case 1; and to Captain Pooran Singh, I.A.M.C., for the stool examinations in case 2.

RECTO-URETHRAL FISTULA

REPORT OF A CASE

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M.D. Toronto, F.R.C.S., F.R.C.S.C.

MAJOR R.C.A.M.C.

A German prisoner-of-war, aged 33, had had at the age of 16 years a swelling of the right testis and a urethral discharge, of which there were no residual signs. In 1940 he had been in a motor accident. Otherwise his previous history was negative, except for constipation; there was no history of tuberculosis or of venereal disease. In February, 1944, he noted the passage of fæces per urethram and of urine per rectum on straining at stool. He was investigated and cystoscoped in a German hospital. He developed left-sided epididymitis and a sinus remained on the left side of the scrotum after drainage.

After his capture he was investigated in a Canadian military hospital. There was a small scrotal sinus draining from the left side. The right side appeared normal. There was no induration or thickening about the fistulous tract in the perineum. When cystoscopy was attempted the instrument passed easily straight backwards and came out through the anus (fig. 1) without causing either pain or bleeding. Seen through the cystoscope the opening and tract of the fistula appeared to be lined with smooth mucosa, without any discharge or inflammation. The tract extended from the bulbous urethra to the anal canal just above the sphincter ani. This was verified with a sigmoidoscope. The bladder

2. Rogers, L. Bowel Diseases in the Tropics. London, 1921; p. 247.

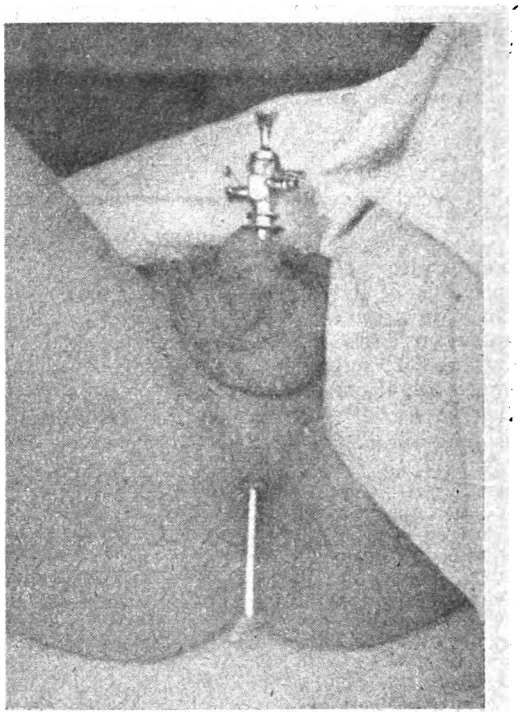

Fig. 1—Cystoscope passing out through anus.

was filled with radiopaque dye and an X-ray film was taken while the patient was straining to empty his bladder. The resulting urethrogram is shown in fig. 2.

Tuberculin test was negative, and radiography of the chest showed no abnormality. Cultures from the urine and scrotal sinus and biopsy of the sinus tract did not establish any cause of the fistula.

The appearance, size, and position of the fistula suggest that there is a congenital connexion between the urinary and intestinal tracts, and this was responsible for the patient's epididymitis at the age of 16 and for the passage of fæces per urethram and urine per rectum on straining at the age of 33. It could probably be readily cured by excision after preliminary colostomy.

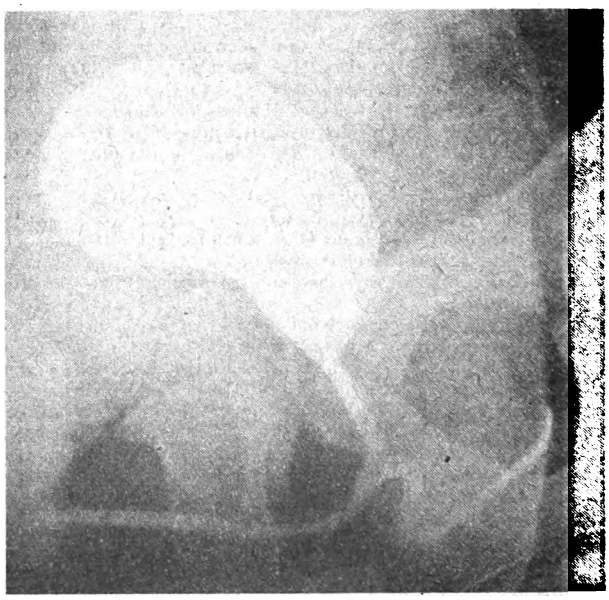

Fig. 2—Cysto-urethrogram showing fistula passing from bulbous urethra to rectum.

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TRICHINIASIS PRESENTING WITH FOOT-DROP AND FACIAL PALSY

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THE following case shows that trichiniasis should be considered in the differential diagnosis of unexplained neuritis in this country.

An East-end housewife, aged 39, was admitted for right foot-drop and right facial palsy of four days' duration. She had complained of generalised abdominal pain, vomiting, and constipation fourteen days previously. She had also noticed a cough and breathlessness on effort, not present before.

On admission she had sacral œdema, subungual "splinter" hæmorrhages, and mental depression. She was apyrexial, apart from a peak of 99·2°F on her third day in hospital, and she had moderate tachycardia (average pulse-rate 96 per min.) with respirations 20 per min. Blood-pressure 150/100 mm. Hg. A blood-count showed 16,800 white cells per c.mm., with 33% eosinophils (5600 per c.mm.) and 33% polymorphs. Examinations of cerebrospinal fluid and urine showed nothing abnormal. There were no worms or ova in the stools. Blood Wassermann and Kahn reactions were negative. There was no eyelid œdema. She habitually ate lightly cooked pork sausages and had done so regularly before admission and before her illness. No other member of the family was affected.

Neurological examination showed complete right foot-drop and full sensory loss over the skin supplied by L5 and S1, with partial loss over L4 area. Right ankle-jerks and knee-jerks were diminished; the plantar reflexes were flexor. There was paresis of the right facial muscles below the eye, but the facial weakness was already improving on admission. She could not articulate clearly. Full examination showed no other neurological abnormalities.

Capillary microscopy (E. D.): The "splinter" hæmorrhages (examined at ×60 magnification) consisted of groups of flame-like blood streaks with a circular structure at the base of each group, containing a crescentic object which was not unlike a trichinella embryo but may have been a plug of blood-cells. A week later there was no sign of this basal mass, and the streaks were fewer. Muscle biopsy was not permitted.

Course: Mental depression and sacral œdema disappeared within a few days. Facial palsy recovered after four days in hospital. Return of inversion movement of the foot and dorsiflexion of the big toe began on the twelfth day in hospital, and improvement continued slowly. Eosinophil-count on fourteenth day was 40% of 12,600 cells.

The patient was last seen nine weeks after the onset of the illness. Dorsiflexion of the right foot, although improved, was still deficient, but there was only slight progress in inversion. There was no improvement in sensation. Eosinophils amounted to 16% of 14,700 cells. She was still strikingly depressed.

An intradermal test with trichinella antigen (0·01 ml. of 1 in 10,000 solution) performed 2 months later was negative.

COMMENT

The subungual "splinter" hæmorrhages gave the first clue to the diagnosis, and the well-marked eosinophilia and the clear history of eating underdone pork confirmed it.

With regard to the negative intradermal test, there were some examples of negative responses when this test was applied to clinically definite cases in the Greenwich outbreak of 1941 (Davis and Allott 1941).

Kaufman (1940), reviewing the neurological complications of trichiniasis, pointed out that peripheral neuritis developed occasionally, and that cranial nerves were rarely affected; encephalitis was more common. Merritt and Rosenbaum (1936) summarised the reports of trichiniasis affecting the nervous system and described 2 of their own cases. Chasanow (1928) reported a case with facial palsy, and Spink (1935) described one in a woman with right hemiplegia and left facial palsy.

The combination of neurological features in our patient is unusual. We would emphasise the need for careful examination of the nails and a leucocyte-count and eosinophil-count in unexplained neuritis.

We thank Mr. J. R. M. Whigham and Dr. A. B. Rosher and their staff for help.

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Reviews of Books

The Essentials of Obstetrics and Gynecology

WILLIAM ALBERT SCOTT, M.B., F.R.C.O.G., professor of obstetrics and gynecology, University of Toronto; H. BROOKFIELD VAN WYCK, M.B., F.R.C.O.G., assistant professor of obstetrics and gynecology in the university. London: H. Kimpton. 1947. Pp. 379. 27*s.* 6*d.*

IN this Canadian book there is hardly a word wasted, and the condensation of the not inconsiderable subject matter is quite a feat. Whether or not this is a good thing is more debatable. The student, whom the authors describe as liable to flounder in a new subject, is less likely to flounder than to drown in a positive mill-race that rips through sterility in a couple of pages and pelvic infections in seven. Brevity should, of course be classed as virtuous, but it is very hard to write briefly and well: such writing must either give adequate information and advice on which to act or at least to think, or alternatively should stimulate the student to further inquiry. In both respects the authors have to some degree failed. The subject matter is sound and reasonably well up to date; though the student who hangs grimly on to the fundus of his astonished patient for an hour after the completion of labour is likely to make rather a nuisance of himself.

Principles in Roentgen Study of Diseases of the Chest

W. SNOW, M.D., director of radiology, Bronx Hospital, New York. Springfield, Illinois: C. Thomas; Oxford: Blackwell. 1946. Pp. 414. 55*s.*

THE description of X-ray appearances of pulmonary diseases in this book is based on Dr. Snow's idea that in almost all intrathoracic diseases obstructive emphysema, atelectasis, and œdema are present in different degrees. He believes that the size of the involvement and the rate of development differ, for example, in bronchitis, pneumonia, tuberculosis, lung abscess, and whooping-cough. This is an interesting approach to the problem of X-ray interpretation, but he does not make the most of it. In an attempt to prove his hypothesis he allows the volume to become unbalanced and we find much more space devoted to pneumonia and bronchitis than to tuberculosis, while the important subject of pneumoconiosis is given only $3^1/_2$ pages. The illustrations, unfortunately, are of indifferent quality.

Standard Methods of the Division of Laboratories and Research of the New York State Department of Health

(3rd ed.) AUGUSTUS B. WADSWORTH, M.D. London: Baillière. 1947. Pp. 996. 55*s.*

ELABORATE encyclopædias of laboratory medicine were once a feature of German medical literature, as they are of the American literature today. There are 990 pages of this work, and it is interesting to consider how many of them would have to be omitted in an English publication, and with how much loss. A New York epic is today a London epigram.

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This third edition is an account of technical methods in one American institution; it does not take the place of even more massive works such as "Gradwohl," which are both textbooks and accounts of alternative methods. Indeed, it is difficult to see why many chapters are included at all; those on protozoa and intestinal parasites, for example, are not even illustrated—though the book contains 9 full-page illustrations of containers for postal transmission of specimens. At the other extreme is the chapter on the Wassermann test, which is performed with a "new" antigen, and by a technique of great complexity, very fully described. However, all sections have a useful bibliography. The book will chiefly be of value to directors of large institutions for laboratory diagnosis.

Importancia biologica del potasio

VINCENTE H. CICARDO, profesor titular de fisica biológica, Universitad Nacional de La Plata. Buenos Aires: El Ateneo. 1947. Pp. 245.

IN these days of monographs on special aspects of biology and medicine, it is not surprising to find that a book has been written on the biological importance of potassium, though to the outsider this must seem a very small field. In this work Professor Cicardo reviews international literature very fairly and completely, and gives a clear and simple account of most of the work done. Cellular and extracellular potassium are discussed; its toxicity and its function in the muscular and nervous systems are reviewed. A longer section is devoted to the importance of potassium in Addison's disease and in shock. The author's own work, which has nearly all been published within the last ten years in the *Compte rendu de la Société de biologie, Paris*, or the *Revista de la Sociedad argentina de biologia*, has been largely on the escape of the potassium ion from the cells during activity, after injury and hypophysectomy, and under other experimental conditions. He tends, naturally, to give prominence to his own experimental results, and these certainly seem to merit serious attention.

Beiträge zur Kenntnis der Blutgerinnung

W. K. RIEBEN, professor of experimental medicine, University of Oregon. Basle: B. Schwabe. 1947. Pp. 96. Sw. fr. 9.

Professor Rieben prefers the two-stage technique of prothrombin estimation. Quick's one-stage technique, he says, measures only the speed of conversion of prothrombin to thrombin. In some conditions—e.g., with stored plasma—the speed of the reaction is decreased while the prothrombin concentration remains unaltered; here Quick's technique may give misleading results. There is also the advantage that in the two-stage method a thromboplastin preparation of standard activity is unnecessary. The two-stage method has, however, its own difficulties, and these are fully considered. Various aspects of blood-coagulation are studied by the author's own two-stage method. The original part of the book deals with the effects of various amino-acids and some other substances on blood-coagulation. The experiments were done on dogs and the stage of the coagulation reaction affected by the different substances is determined.—*d-l* cysteine and *l*-ascorbic acid, for instance, act as anti-prothrombins; *l*-dioxyphenylalanine and *d-l* adrenaline act as anti-thrombins. It is for this latter section that the book is worth consulting; the other parts have been thoroughly dealt with elsewhere, especially in the American literature.

Walker and Percival's Introduction to Dermatology (11th ed. Edinburgh: E. & S. Livingstone. 1947. Pp. 339. 35*s*.).—One of the merits of Prof. G. H. Percival's new edition of this book is the profusion of coloured photographs and coloured photomicrographs. At the same time some of the character of Sir Norman Walker's original work has been preserved by the retention of many of the original coloured illustrations of moulages. These, curiously enough, are often an even more accurate representation of the diseases illustrated than the more modern colour prints. The text has been revised and redundant matter eliminated, so that the work has the rare quality of containing fewer pages than the previous edition.

Textbook of Pathology (5th ed. London: H. Kimpton. 1947. Pp. 1049. 48*s*.).—Prof. William Boyd, in the preface to this latest edition of his widely used book, is modest about his achievement in producing it. "Some of the more glaring errors," he says, "have been corrected." But he gives a formidable list of new sections, mentions the inclusion of new material on some thirteen other subjects, and notes that a large number of sections have been rewritten, and readers may confidently ignore his depreciative comment.

Handbook of Diagnosis and Treatment of Venereal Diseases (3rd ed. Edinburgh: E. & S. Livingstone. 1947. Pp. 375. 15*s*.).—The new edition of this sound little book has kept well abreast of modern trends. Dr. A. E. W. McLachlan supports the decision of the Ministry of Health not to recommend that penicillin alone be used in the treatment of early syphilis, and advises that 7·5–10 million units be given over a period of 15 days in addition to a standard course of an arsenical drug and bismuth. Unlike many of his colleagues, he has been fortunate in his experience of penicillin in the gonococcal vulvovaginitis of small girls, reporting "no failures so far"; and his statement that decided improvement is seen in half the cases of interstitial keratitis treated with penicillin will seem over-optimistic to many.

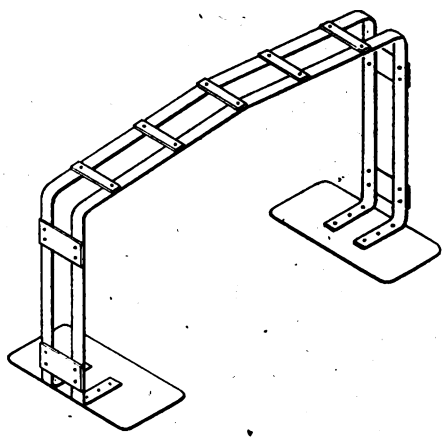
Synopsis of Neuropsychiatry (2nd ed. London: H. Kimpton. 1947. Pp. 561. 32*s*. 6*d*.).—Dr. Lowell S. Selling's closely packed reference book has evidently proved useful. In the section on psychiatry chapters have been added on psychosomatic medicine and psychiatric therapy; and the chapter on psychopathic personality has been rewritten. Military aspects of the subject have been withdrawn in favour of the neuropsychiatric disasters of peace.

Illustrations of Regional Anatomy (7th ed. Edinburgh: E. & S. Livingstone. 1947. In 7 sections. Pp. 320. 75*s*.). The seventh edition of Dr. E. B. Jamieson's vivid anatomical illustrations will give pleasure to those who must still—despite many criticisms of a time-squandering curriculum—study the minutiæ of anatomy for the preclinical examination. The brilliant colouring of these careful drawings often rouses the irony of senior anatomists; but students like them, and students are here the proper judges. Here, they say, is the luxury way of learning anatomy; and if that memory feat can be turned into a luxury Dr. Jamieson surely deserves credit.

New Inventions

NEW TYPE OF BED CRADLE

THIS bed cradle covers the patient's feet only and allows them to move freely without encumbrance from the bedclothes. It allows the clothes to come in contact with the legs from well below the knees and thus keeps the patient much warmer than does the usual type of cradle. It also leaves free the greater part of the bed as a flat surface on which the patient can pursue his interests.



The bed cradle is made of steel, the arches being $^{3}/_{16}$ in. and the base-plates and small pieces $^{1}/_{16}$ in. thick. The width of the cradle is 37 in. and its height $16^{1}/_{2}$ in. at the sides, rising to $17^{1}/_{2}$ in. in the middle. It was designed by the late Dr. H. B. Williamson of Preston Hospital, North Shields.

Newcastle-upon-Tyne. T. H. BOON, M.D., M.R.C.P.

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THE LANCET

LONDON: SATURDAY, JAN. 24, 1948

By Daylight

NEXT week every doctor will be asked whether he approves or disapproves of the National Health Service Act. In addition, consultants and specialists, general practitioners, and those working whole-time in voluntary hospitals will be asked whether they are prepared to refuse participation in the new service. In putting these questions the British Medical Association advises decisive rejection, and presents a picture of the National Health Service which must cause moderate men and even former admirers of the project to turn away in revulsion. This picture's lurid appearance, however, is partly an effect of artificial illumination, and before the Act is accepted or rejected it ought to be carefully examined by daylight.

THE COMPREHENSIVE SERVICE

Great Britain has had a national medical service since 1913, when National Health Insurance was introduced by politicians against the will of most of the profession. Both to the public and to doctors the scheme proved unexpectedly advantageous, and by 1930 the B.M.A. was recommending its extension, with improvements, to the dependants of insured persons. Continuing this initiative, the medical advocates of reform had fairly general support from their colleagues until in 1942 the Beveridge report on Social Insurance proposed that every single member of the community should become entitled to full medical care without paying a fee. The subsequent controversy over this "100%" issue was crucial. Doctors almost everywhere have long been content or glad to see public provision made for the less affluent sections of the community, provided they are left free to practise privately among people who are in a position to pay. But as soon as everybody can receive treatment at the public expense the doctor is faced with quite a different situation. Obtaining all or nearly all his income from public funds, he may feel that he has surrendered both his private status and his opportunities for enterprise; he can no longer play Robin Hood (as so many have done to the benefit of their poorer patients), and his livelihood and even his manner of practice depend on central decisions. On the other hand, there are cogent reasons why, if there is to be a national service, it should cover all alike. The relatively well-to-do 10% of the population, with an income above £400–500 a year, includes just those middle-class people on whom the cost of illness, whether treated at home or in hospital, is apt to fall most disastrously. Again, the defects of a service are far more likely to be remedied quickly if influential persons begin to use it; and there are administrative advantages in uniformity. But perhaps the chief reason why Government after Government has wanted the service to be all-embracing is psychological. There was, and is, a deep-seated need to continue into peace the sense of equality in citizenship which was engendered during the war, alike on the battlefield and in bombed cities: indeed the social-security scheme, with its attempt to guarantee a minimum standard of safety and care for all, regardless of apparent merit, has been widely thought of as the nation's principal war memorial. To many in our own profession a service comprehending everybody was particularly attractive, because the idea that medical attention should be dissociated from capacity to pay is in line with what we like to think is the medical tradition. Socially men may differ in value and achievement, but before God and the doctor they are equal.

The point we want to make here, however, is merely this. From the moment that the Negotiating Committee accepted the major premise that "the service should be available to the whole community" it was committed to a radical change. It had agreed, wisely or unwisely, that the profession must henceforward perform its task within the framework of a public service, and that the basis of ordinary medical work can no longer be private practice for fees. This granted, all that remains in dispute is whether the Act makes good arrangements for such a service.

ADMINISTRATION

When it declares that every citizen shall be entitled to the best available medical care, Parliament must make somebody (or some body) responsible for seeing that he can get it. Of the various possible recipients of this administrative responsibility the one that most appealed to the B.M.A., and to ourselves, was a British Medical Corporation which should enjoy the kind of autonomy given to the B.B.C. It was soon recognised, however, that whereas the B.B.C. lives on its own income a medical corporation would have to spend Exchequer money and would therefore have to work under the control of a Minister responsible to Parliament. Thus limited in independence, the corporation would in fact differ so little from a Government department that the difference in name would be immaterial. Impressed by the dangers of too much central direction, the Coalition Government chose the alternative of shifting responsibility to the periphery, and placed most of it on joint boards formed by local authorities responsible to the ratepayers. To the profession, however, this seemed an exchange of the frying-pan for the fire, and its objections led Mr. WILLINK to adopt a rather nebulous compromise in which the Ministry resumed responsibility but had no satisfactory means of discharging it locally. When Mr. BEVAN succeeded Mr. WILLINK it was expected that he would pursue an orthodox Socialist policy; but in fact he presented us with a functional solution which had previously been dismissed as impracticable when mooted in these columns and elsewhere. Expropriating all hospitals, both voluntary and municipal, he acquired effective control over the hospital service and then proceeded to delegate it to 14 regional corporations (or hospital boards) and through them to hospital management committees. (For the teaching hospitals he recognised the need of a separate and privileged status.) Having in this way delivered hospitals from the elected local authorities, he entrusted the general-practitioner

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services to another group of non-elected corporations, the local executive councils. On all these corporations he arranged for the various interests—the municipalities, the professions, and the public—to be suitably represented, and at the centre he retained an expert Central Health Services Council, with standing committees, to advise him as Minister. His scheme is open to the criticism that its efficiency depends on smooth interlocking between its three parts—the hospitals, the local authorities (with their personal health services), and the general practitioners. But if there is any feasible plan for administrative control which might be more acceptable to the medical profession we have yet to hear of it.

The Negotiating Committee complains of "an excessive concentration of power in the hands of the Minister"; but there is no escaping the fact that responsibility, and therefore power, must be vested in somebody or some body responsible to an elected assembly—Parliament or the local authorities. The Act allows that power to be largely delegated to boards and councils of which there will always be many medical members, and the whole scheme is specifically designed to check the tendency to central direction.

THE GENERAL PRACTITIONER

Organisation on a large scale is always a disagreeable process, especially to people who have hitherto managed all their own affairs. Having admitted the need, however, the profession is no longer entitled to protest against the public organisation of all medical services, or to condemn an administrative structure to which it has suggested no preferable and practicable alternative. If reason rather than emotion is to be our guide, the Act cannot be rejected because of a vague dislike of the whole affair: we are justified in rejecting it only if it has definable faults which the Government is in a position to remedy with eventual advantage to the public. Here we come to the real differences of opinion between the Minister and the B.M.A.; for the latter argues that to get a good service the general practitioner's professional independence must be better assured, and that this is possible only if he does not receive a basic salary, if he continues to own the goodwill of his practice, if he can always work wherever he pleases, and if complaints about his conduct can be referred to the law-courts. The B.M.A. sees the Government's proposals as the first step towards a whole-time State salaried service in which the doctor can call neither his practice nor his soul his own.

We have repeatedly pressed the Minister to drop the basic salary—not because it is bad in itself but because it is not essential to the working of the Act and because he ought to remove all unnecessary sources of irritation and anxiety. Though they may accept his arguments about its usefulness, doctors will still distrust it as an instalment of a salaried service to be imposed on an unwilling profession for extraneous reasons. And the risk of such imposition is real. Even so, however, it is well to look at past and present facts rather than confine one's gaze to hypothetical eventualities. In 1911, as now, the profession was warned that National Health Insurance was the first step towards a State salaried service; yet no Government has attempted to use its legal right to pay panel practitioners by salary. Today, 37 years later, we are warned again; yet even now, with a Socialist House of Commons and a left-wing Minister of Health, the salaried service remains in the clouds. The "fixed annual payment" of £300 may be a source of partial satisfaction to Mr. BEVAN's party, but so long as it remains small it yields neither the advantages nor the disadvantages of remuneration mainly or entirely by salary. The principal object of paying practitioners by salary is to abolish competition for patients, with all that this implies: and since it reduces competition the salary is one of the possible means of stopping the drain on public funds caused by doctors giving certificates to people they cannot afford to offend. If the profession cannot itself find ways to prevent grossly unfair certification by a proportion of its members some subsequent Government may indeed feel obliged to safeguard these funds by changing capitation fees into salaries. Like this one, however, all Governments will be bound to take account of the value of competition as an incentive to work, and of the difficulty of reconciling salaried service with free choice of doctor. Like the rest of us, any Government will be aware that, though payment of general practitioners by salary would cure certain evils, it is a remedy which has harmful side-effects and which has not yet been adequately tried on an experimental scale. Unless this or some later Parliament can be persuaded to reverse its considered verdict, the Government and its successors will of course remain free to introduce a salaried service. But so long as success can fairly be claimed for remuneration mainly by capitation fees, any Minister of Health will have reason to think twice before doing so. Mr. BEVAN himself has thought twice. It seems, indeed, a little unreasonable that he should be blamed so much for introducing a salaried service when that is precisely what he has refrained from doing.

Like the basic salary, abolition of the sale and purchase of practices has become a major issue chiefly through loss of confidence in the Minister's intentions. The buying and selling of practices has never been one of the pleasanter features of medicine, and its defenders must sometimes find it hard to speak in the same breath about the sacredness of the doctor-patient relationship. In a public service this method of filling vacancies has additional demerits since it increases the difficulty of correcting maldistribution of medical resources. The B.M.A. believes that when a capitation fee is payable for every citizen, and money is set aside for attracting doctors to uncongenial or unprofitable areas, there will be no need for machinery to prevent concentration of medical talent in particular places; and if the B.M.A. is right, so much the better—let the machinery rust. But we have never concealed our opinion that a Minister responsible for a service must hold powers of negative direction even if he may not need to use them, and we have never been persuaded that the exercise of these powers would involve any substantial hardship.

The vital issue of professional freedom arises far less on the functions of the Medical Practices Committee than on the question of appeal to the courts. Believing that before the doctor is asked to surrender the security of his private practice he should be offered the strongest possible assurance of justice

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within the service, we have urged Mr. BEVAN to concede what is demanded; though we have never denied the logic of his objections. By way of exploring the possibilities of agreement we have lately asked him for further explanations, and his replies which we publish this week show that in this matter of justice he has taken great pains to devise arrangements which in fact ensure that the practitioner is fully protected. Unlike the law-court, the tribunal offers the doctor (if he desires it) the advantage of privacy, which may mean localisation of mischief; and the Minister may well be right in thinking that if he were to accede to the profession's request, and replace appeal to the tribunal by appeal directly from the executive council to the courts, the practitioners concerned would often have reason to regret the change. His replies do something to encourage a hope that a solution acceptable to both sides will yet be reached. Be that as it may, this is evidently another case in which an aggrieved outcry is acceptable only from people who have something better to propose.

CONCESSIONS

Many have been annoyed—ourselves among them—by the Minister's unwillingness to concede anything appreciable at his final meetings with the Negotiating Committee. Antagonised by the committee's use of the negotiations for purposes of opposition, he has too often adopted an arbitrary attitude which feeds the fears of those who do not like to see a politician responsible for a professional service. Others feel that, as a statesman, he should have been more accommodating on non-essentials. To which he replies that he is not an oriental bargainer, and that his important concessions have already been embodied in his Act. That he remains willing to meet practical difficulties is shown by his answer to our question on partnership agreements.

The accusation that he has conceded nothing is of course nonsense: all parties in these discussions—the Government, the local authorities, the voluntary hospitals, and the profession—have conceded a great deal. The profession has given in on the cardinal 100% issue. The voluntary hospitals and the local authorities have surrendered their hospitals, not without misgiving. Mr. BEVAN on his side has departed from Socialist doctrine in planning the hospital service, in allowing private practice to all doctors in the service (with private use of beds in public hospitals), and in making capitation fees the principal means of remunerating practitioners. The result of these and other modifications is a delicately balanced compromise which fully pleases nobody at all—certainly not the Socialist Medical Association, Mr. BEVAN's back-benchers, or the local authorities. If we remove the picture from the beam of red light in which the B.M.A. is now presenting it we see that, whatever its faults of composition, it is certainly not a study in scarlet. Actually it is a composite picture, containing plenty of green, blue, and yellow touches recalling the work, among others, of LLOYD GEORGE, the Royal Commission on National Health Insurance, Lord DAWSON, the British Medical Association, the Medical Planning Commission, Medical Planning Research, and the Coalition. And if it did not happen to be signed "Aneurin Bevan" it might perhaps be more justly appraised.

PAST, PRESENT, AND FUTURE

"No-one," wrote SAKI, "can effectively defend a Government when it's been in office several years"; and post-war Governments are at a special disadvantage. The National Health Service Act—essentially a non-party measure—is unlucky in being born under the auspices of an Administration which, of necessity or otherwise, has imposed on the public and on industry a great many unpopular measures of control. It is unlucky too in being born at a time of economic danger when there is no early hope of a brave new service with modern hospitals, abundant health centres, more leisure, and better doctoring. Few dare deny that the immediate effect of the Act may be more overwork and fewer chances of practising really well: when everyone is "on the panel" the demand for medical attention may be such as to lower its quality still further for the time being. But it was always wrong that a genuine need for the doctor's help should be concealed—as it so often is—by incapacity to pay; and by placing everybody on the same footing the Act will make it easier for the practitioner to give his services where they will be of most help. Above all it will enable him to obtain what is necessary without considering whether the patient can afford it. In innumerable families the removal of financial burdens imposed by illness, whether at home or in hospital, will bring incalculable relief, and this relief will be felt not least by the family doctor. Even without expenditure on buildings, moreover, considerable improvement in hospital and specialist services should soon be attainable through the more rational organisation which the regional boards are intended to promote. With a little inspiration in our leadership, it would not be long before the profession itself assumed an active rather than a passive rôle and began to rise to its opportunities of influence. The Act is nothing if not a great experiment, and by giving a large share of administration to the people who are being administered (including the practising doctor) it creates a new and more promising kind of State service. "Given a chance, the National Health Service may develop a new pattern of relationship between governors and governed from which democracy will learn much."

At present the profession is in the same position and mood as a local population which admits the need for a new town but raises objections to every possible site and plan. This one will not do because it removes some old cottages or a grove of trees; another would spoil the view of the river; and of course a power-station would be impossible anywhere. The effect of such opposition—which always carries a strong emotional charge—is that no new town can ever be built unless ruthless authority is exerted; and for a long time after the work begins the opponents of the scheme appear to be more than justified, since during development the whole site looks far worse than before. By nature, older men and women are almost always unready to relinquish the familiar—the old street, the old way of gaining a livelihood, the old principles. And sometimes they are right. But the young, after their manner, look at things a little differently. While many of the senior members of our profession, led by the B.M.A. council, see this Act in terms of regulation, and interference with

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property and enterprise, the younger generation on the whole is concerned about its chance to do good work without having to spend much thought on raising capital and finding an income. Each group has the scale of values proper to its own time, but the newer appeals to us the more because it harks back to an older period when medicine was less of a business and more of a service.

Annotations

RESULTS OF CHOLERA VACCINATION

INOCULATION against cholera is now compulsory for all travellers through the Mediterranean and is likely to remain so for some time. The value of protective inoculation against this disease has therefore become of immediate interest to doctors in this country. The cholera epidemic in Egypt, for the time being at any rate, has been controlled, and the various measures applied to this end have included mass inoculation of the population at risk. Wholesale inoculation of the Egyptian population is being advocated as an important step towards preventing the possible recurrence of the disease when the atmospheric humidity rises again in May.

Prophylactic inoculations against cholera have been practised extensively since Ferran, Haffkine, Kolle, and other pioneers introduced their various vaccines. But there has been a general and growing scepticism in recent years as to their value. At best inoculation was said to confer an ephemeral immunity; at worst it was regarded as completely useless. The significance of the various serological types of *Vibrio cholerae* has only lately been appreciated, and it is clear that much, if not most, of the cholera vaccine used in the past was antigenically unsuitable for its purpose. The value of prophylactic cholera immunisation is however by no means easy to assess. As an epidemic of the disease rapidly progresses beyond its peak the virulence of the infection diminishes and the mortality lessens. Seasonal climatic changes play their part, and it is hard to decide what contribution protective inoculation has made towards ending the epidemic. Even the value of vaccination as a measure of personal prophylaxis has been in doubt. The degree of effective exposure to infection of individuals during an epidemic is difficult to determine; and thus the incidence of the disease in inoculated and in uninoculated persons in a limited community is not necessarily a reliable guide to their relative immunities to infection. There have been no reliable figures showing the differences in the mortality-rates from the disease in the protected and in the unprotected.

In India, Adiseshan et al.[1] and Sekar[2] have analysed the data obtained during the great outbreak of cholera which ravaged more than two-thirds of Madras Province in 1942–43. This epidemic was one in the six-yearly cycle of cholera outbreaks usual in this area, and it was fomented, as is commonly the case, by drought and famine. Pilgrim traffic, and the flight of refugees from villages attacked by the disease, spread the infection widely within a few months. Some 300,000 cases, with 169,400 deaths, were recorded. The organism predominantly responsible for this outbreak was the Ogawa type. Mass anti-cholera inoculation with the standard vaccine for India, containing both Ogawa and Inaba types of vibrio, was begun. Some 12,480,000 persons were given a single injection of 8000 million organisms, and it is the value of this protection that is under examination. Evaluation of the comprehensive data obtained from many village communities throughout the affected area shows that 1118 cases of cholera appeared among 709,977 inoculated persons (1·57 per 1000), while 34,336 of 2,119,568 unprotected persons (16·2 per 1000) contracted the disease. These figures are statistically significant. The ratio of infection-rates among the protected and the unprotected was 1 : 10·3. In subsequent recurrent outbreaks in some of the same village communities the difference in the incidence of the disease among inoculated and uninoculated became even more evident (0·86/1000 and 12·14/1000: a ratio of 1 : 14·2). On the other hand, the death-rates from the disease in the two groups were not significantly different.

There is therefore evidence that the present prophylactic inoculations afford definite personal protection against contracting cholera. Further analysis of the Madras figures shows that the immunity engendered by a single inoculation appears on the fourth day and increases to an effective level by the eighth day. The protection given persists for six months and probably for a year. It follows that mass cholera inoculations of the kind now used can play an effective part in arresting outbreaks of cholera in a community and in limiting its spread to fresh areas.

1. Adiseshan, R., Pandit, C. G., Venkatraman, K. V. *Indian J. med. Res.* 1947, **35**, 131.
2. Sekar, C. C. *Ibid*, p. 153.

NETTLE STINGS

THE identification and assay of substances which affect the body in very small concentrations have been closely studied in the last few years, and methods have been devised for testing these substances biologically as well as chemically. When two or more such substances are mixed together their identification and assay may involve the painstaking application of all the methods available. These methods have led to important advances in our understanding of the chemical control of physiological processes and there is also hope that their application may throw light on the genesis of some pathological changes. An example is the work of Emmelin and Feldberg[1] on the mechanism of the nettle's sting. The nettle hair consists of a fine capillary tube calcified at its lower end, silicified at its upper end, and closed at the tip in the form of a little bulb. This bulb breaks off in a predetermined line when it comes in contact with the skin, leaving exposed a fine point formed by the upper tapering part of the hair. The pressure of contact drives this fine tube into the skin and compression of the bladder-like base then injects the contained fluid into the minute wound.

The old view was that the toxic substance in the fluid is formic acid but this was disproved as early as 1886 by Haberlandt.[2] More recently it has been assumed that the toxic substance, whatever its nature, acts by releasing histamine from the human skin, possibly by acting as an antigen in an antigen-antibody reaction. Emmelin and Feldberg find that the explanation is much simpler and yet very remarkable. The hair fluid contains high concentrations of histamine itself and even higher concentrations of acetylcholine. These two substances were identified and assayed by careful pharmacological methods involving studies of its action on the cat's blood-pressure, the rabbit's and guineapig's intestine, and the frog's rectus, and the selective inhibition of the action of acetylcholine by atropine and of histamine by the anti-histamine substance thymoxyethyldiethylamine. In addition a third substance was found which contracts smooth muscle, but this has not yet been identified.

Experiments were then performed on human subjects and it was found, as is well known, that the intradermal injection of histamine produces the triple reaction which is associated with a strong itching sensation. If histamine

1. Emmelin, N., Feldberg, W. *J. Physiol.* 1947, **106**, 440.
2. Haberlandt, G. *S. B. Akad. Wiss. Wien. Math.-Naturw. Kl.* 1886, **93**, abst. 1, p. 123.

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is injected together with acetylcholine there is a strong burning sensation followed by itching, which outlasts the burning sensation. Acetylcholine itself produces no definite sensation. Hence the combination of histamine and acetylcholine produced the sensation characteristic of the nettle sting and it is clear that this is the mechanism by which the nettle produces its effect.

A remarkable feature of these results is that the plant tissues should contain such high concentrations of substances hitherto only known to be physiologically active in animals. This is, however, by no means an isolated finding, for œstrone and œstriol have been extracted from plants,[3 4] and ascorbic acid, which can be synthesised by some animals, is present in high concentrations in some plants. Further work is necessary to determine whether these substances are merely incidental metabolic products or whether they serve a function in the plant.

INCLUSION BODIES IN INFANTS

As editor of the *J. Path. Bact.*, A. E. Boycott used to object to publishing papers which dealt with technique alone. A scientific journal, in his view, should deal with aspects of truth, while the newest devices of the histologist should appear in the next editions of his beloved "Bolles Lee." He was probably right, but it would be a stony-eyed editor who refused the beautiful illustrations of inclusion bodies stained by a new phloxin-tartrazine method devised by Lendrum and published in the July, 1947, number, which has just appeared.[5] Here is art as well as science, though both the "why" and "how" must remain obscure except to experts with hæmatoxylin-stained fingers. It is said that the motif for a wall-paper was derived from one of Canti's tissue-cultures, and the makers of printed fabrics might well find new designs in the literature of histology.

In the same issue Cappell and McFarlane [6] have applied the phloxin-tartrazine method, among others, to the elucidation of the curious intracellular bodies seen from time to time in infants. Originally described as "protozoon cells," they have been associated with many of the fatal diseases of children and especially with syphilis. That they were protozoa seems to have been accepted until Goodpasture and Talbot [7] showed that they arise from altered tissue cells and remarked on their similarity to the bodies seen in the "salivary-gland disease" of guineapigs. Since the picture of hæmolytic disease of the newborn has become clearer these bodies have been noticed in some fatal cases, and Cappell and McFarlane describe two examples in which iso-immunisation of the mother by any of the known blood-group antigens carried by the fœtus was excluded. They maintain that the intranuclear and cytoplasmic inclusion bodies result from a virus infection akin to that seen in guineapigs and apes, and on that analogy specific to man.

Do saprophytic viruses exist? Barnard [8] thought he had evidence of this. Or is an obligatory intracellular parasite whose invasion does not noticeably disturb the body's economy to be called a saprophyte? There is reason to think that herpes simplex,[9] mumps,[10] and probably measles invade a fairly large proportion of the juvenile population without any clinical evidence of infection. But the evidence for this is mostly oblique and confirmation by more direct methods is desirable. The new histological techniques, however intricate, might help to provide this confirmation.

3. Skarzynski, B. Quoted in *Brit. chem. Abstr.* A, 1934, p. 702.
4. Butenandt, A., Jacobi, H. *Hoppe-Seyl. Z.* 1933, **218**, 140.
5. Lendrum, A. C. *J. Path. Bact.* 1947, **59**, 399.
6. Cappell, D. F., McFarlane, M. N. *Ibid.* p. 385.
7. Goodpasture, E. W., Talbot, F. B. *Amer. J. Dis. Child.* 1921, **21**, 445.
8. Barnard, J. E. *Brit. J. exp. Path.* 1935, **16**, 129.
9. Burnet, F. M., Williams, S. W. *Med. J. Aust.* 1939, **1**, 637.
10. Maris, E. P., Enders, J. F., et al. *J. exp. Med.* 1946, **84**, 323.

THE RIDDLE OF DYSTROPHIA MYOTONICA

DYSTROPHIA myotonica presents a genetic puzzle which is still unsolved. Any future investigators who attempt to elucidate the manner of its inheritance will be grateful for Dr. Julia Bell's latest compilation of pedigrees and detailed notes,[1] which include a fine body of data (91 pedigrees in all) handed over to her for publication by Dr. Otto Maas. Dr. Bell concludes that Thomsen's disease and dystrophia myotonica are distinct conditions; and in this she differs from Dr. Maas. Undoubtedly from the genetic point of view there is good reason for the separation. Thomsen's disease behaves as a simple dominant and there is little irregularity in the pedigrees. It is striking that the most valuable pedigree of all, that of Thomsen's own family—brought up to date by his great-nephew Nissen, and including 39 affected people in seven generations—conforms perfectly to uncomplicated dominant transmission. In contrast the commoner condition of dystrophia myotonica provides one of the most curious problems in human genetics. It is plain that it is inherited, and in a rough, general way the method resembles dominant transmission with an excess of affected males and considerable skipping of generations. But Maas, a foremost authority, has observed what he regarded as incipient signs of the disease in most or every member of sibships examined by him. This accords with the observation that apparently unaffected members of sibships containing affected persons tend strongly to die young as compared with the general population. It is usual to find high correlations in age of onset between members of the same family group, but in dystrophia myotonica these are strikingly low. Similarly there is a lack of uniformity in severity in affected members of the same sibship. Finally, there appears to be a true antedating—one which cannot be explained away as a statistical artefact—on passing from one generation to the next. We are promised a future paper on this interesting phenomenon. It seems that no genetic mechanism yet discovered can explain these findings, which remain a challenge to research-workers.

EMOTIONAL EFFECTS OF ILLNESS

OF late years many illnesses once looked on as purely physical have been found to have important emotional aspects. For example, during a recent epidemic of poliomyelitis in the United States, Ebaugh and Hockstra [2] found that news of the diagnosis always caused shock and anxiety, with reactive depression, these effects being most severe in cases with bulbar involvement but otherwise not related to the extent of paralysis. In about half the patients there was considerable disturbance in thought and affect, often uncovered by the Rorschach test in people superficially well adapted to their illness. Serial tests showed that relief of these disturbances was possible with psychotherapy, so the American observers feel that skilled psychiatric aid ought to be provided not only in the later stages but in the acute phase of the disease. This point is also made by Stanfield,[3] who recalls that in the Ontario epidemic of 1937, when 2635 cases were recorded, a team consisting of neurologist, psychiatrist, psychiatric social worker, and occupational therapists was set up, and psychiatric interviews were obtained with every patient over the age of 4 years. By this means patients were helped in adjusting themselves to a long convalescence, and parents were taught the proper management and anticipation of behaviour problems in their children—an important

1. Treasury of Human Inheritance. Vol. IV, part V. Dystrophia Myotonica and Allied Diseases. By JULIA BELL, F.R.C.P., with clinical notes by J. PURDON MARTIN, F.R.C.P. London: Cambridge University Press. 1947. Pp. 68. 21s.
2. Ebaugh, F. G., Hockstra, C. S. *Amer. J. med. Sci.* 1947, **213**, 115.
3. Stanfield, C. E. *Ibid*, p. 109.

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feature in recovery, as has been emphasised in these columns.[4] The ease of adaptation to paralytic disease appears to be proportionate to the insidiousness of onset; and the paralysis produces no real personality change, merely evoking and exaggerating existing traits. Psychic trauma is least when the patients are children in parental care, at any rate until adolescence is reached; and the parents often suffer more emotional difficulties than their offspring. Stanfield does not mention the striking euphoria in the extensively paralysed noted in some patients in the current epidemic in this country.

In an allied field, Blanton and Kirk [5] have been studying appendicectomy cases from the emotional point of view. Though conscious anxiety about operation, even in backward regions, has lessened with surgical progress, the unconscious mind still sees the intervention as a bodily attack; but by those with guilt feelings this may be welcomed as just punishment, while to others the operation may mean a pleasant relief from a hard workaday life. Blanton and Kirk believe that a surgeon-psychiatrist-social-worker team is of great value in preoperative and postoperative management and follow-up, and that such a team is even more necessary for major chronic disorders such as cancer, tuberculosis, and bone diseases. They insist that psychiatric assistance in no way interferes with the vital surgeon-patient emotional transference. In fact, while the older experienced surgeon exploits the transference situation, consciously or instinctively, to its maximum for the patient's benefit, the younger man can be helped by his psychiatric colleagues to gain this technique without years of experience. When the surgeon has little time for establishing rapport with his patients, the psychiatric team can help him to heal them in mind and body rather than merely leave them to recover from their abdominal wounds.

POLIOMYELITIS AND THE NASOPHARYNX

THE isolation of virus from the secretions and excretions of poliomyelitis patients and their contacts continues to occupy the attention of many investigators in the United States. In Chicago during the summers of 1945 and 1946 daily swabbings were made from the throats of children who were under observation as contacts. Gordon and his associates [6] subsequently tested pools of material from 5 of them, selected because they eventually developed poliomyelitis, and in 3 showed that virus was present in the pharyngeal secretions at varying periods up to six days before the clinical onset of the disease. Virus has been isolated from the stools as early as nineteen days before the onset of illness and as long as two months or more after recovery. From the pharynx it has not been obtained after the first week of illness. Studies such as those of Aycock and Kessel [7] have shown that the infectivity of clinical cases is limited to a period extending from about four days before to about five days after the onset of illness. This is almost precisely the time during which virus can be demonstrated in the pharynx and the correlation is sufficiently striking to suggest that case-to-case spread is more often due to the transmission of pharyngeal virus than of bowel virus.

Unrecognised infections and healthy carriers are the probable cause of poliomyelitis which cannot be ascribed to contact with a previous case—usually a proportion of at least 20–30% in epidemics. Melnick and others [8] have found virus in the nasopharynx after illnesses regarded on circumstantial rather than clinical grounds as poliomyelitis, and intestinal carriers of virus have often been found in contacts who were free of symptoms. Search for healthy pharyngeal carriers has not yet been made on any large scale but Howe and Bodian [9] recently demonstrated virus in the pharyngeal secretions of 2 out of 28 healthy children sharing a playground with the brothers and sisters of a clinical case; and Kessel and Moore,[10] using material obtained during tonsillectomy, showed that virus was occasionally present in the nasopharynx of healthy children at times when there were no overt cases of poliomyelitis.

On present evidence it seems that the pharynx should continue to receive at least as much attention as the bowel when attempts are being made to trace the source from which the virus of poliomyelitis has spread.

ERYTHRODERMIA IN LYMPHATIC LEUKÆMIA

LEUKÆMIC infiltration of the skin is an uncommon finding. Isolated patches are occasionally seen, but widespread redness ("homme rouge" of the French dermatologists) is rare. An example of this state in a man of 78 with an eighteen months' history of intermittent generalised pruritus has been reported lately by Neumark.[11] Almost the entire skin was red and œdematous, and it was largely scaly; the patient complained of his skin being too tight for him. The lymph-glands were enlarged, but the liver and spleen only slightly bigger than normal. There was a moderate anæmia, and the leucocytes, amounting at first to 26,400 per c.mm., six months later totalled 138,000 per c.mm., 92% being lymphoid cells. Sternal-marrow biopsy showed 75% lymphoid cells, and skin biopsy revealed extensive lymphatic infiltration especially around hair follicles and vessels. At one stage mitosing lymphoid cells were seen in blood-smears; this weird and very unusual sight—in 10,000 cytological examinations mitotic figures in the peripheral blood were noted only 5 times and never in the lymphoid cells—indicates a severe myelopathy and a grave prognosis. The patient was treated with radiotherapy and arsenic, but died six months after he came under observation.

Histopathology of the skin is not very helpful in such cases, for similar pictures are produced by other reticuloses, such as mycosis fungoides and Hodgkin's disease. Cutaneous lesions in leukæmia may take various forms, probably the commonest being the dreaded "hæmorrhagic diathesis." This is found in acute leukæmia, and in chronic cases during exacerbations or as a terminal phenomenon; it is almost always due to thrombocytopenia. Pigmentation of the skin, apart from that caused by X-ray therapy, is fairly common in Hodgkin's disease, but rarer in leukæmia. Furunculosis may occur in all types of leukæmia as an indication of the body's failing resistance. Leukæmia cutis, in the form of erythrodermia, is commoner in lymphatic than in myeloid leukæmia; among 44 published cases of myeloid leukæmia with skin lesions there was only one example.[12] Erythrodermia is always due to an extension of the leukæmic process from within.

AEROSPORIN IN WHOOPING-COUGH

THE small clinical trial of the new antibiotic aerosporin in whooping-cough, reported by Dr. Swift on p. 133, illustrates the difficulty of evaluating any remedy in this ailment. Cases usually come to hospital after the acute infective stage is over, and it is then difficult for any antibacterial drug to do good, though a variety of remedies, from aeroplane rides to rectal ether, seem to relieve the whooping. If any drug is to reduce the mortality and disability of pertussis practitioners must use the laboratory more for the diagnosis of suspected cases in the initial stages.

4. See *Lancet* annotation, 1947, ii, 430.
5. Blanton, S., Kirk, V. *Ann. Surg.* 1947, **126**, 305.
6. Gordon, F. B., Schabel, F. M. jun., Casey, A. E., Fishbein, W. I. *J. Amer. med. Ass.* 1947, **135**, 884.
7. Aycock, W. B., Kessel, J. F. *Amer. J. med. Sci.* 1943, **205**, 454.
8. Melnick, J. L., Horstmann, D. M., Ward, R. *J. clin. Invest.* 1946, **25**, 275.
9. Howe, H. A., Bodian, D. *Amer. J. Hyg.* 1947, **45**, 219.
10. Kessel, J. F., Moore, F. J. *Ibid*, 1945, **41**, 25.
11. Neumark, E. *St Mary's Hosp. Gaz.* 1947, **53**, 117.
12. Nekam, L. *Bull. Soc. franç. Derm. Syph.* 1937, **44**, 1236.

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THE ACT AND THE PROFESSION

Questions Answered by the Minister of Health

WITH Mr. Bevan's permission we publish his answers to a series of questions which we recently addressed to him:

1. *Will the Minister further explain the purposes of the basic salary?*

"Basic salary" is perhaps a misnomer. It suggests a salaried State medical service. But the Minister, in the debate on the National Health Service Act on Nov. 4, 1946, said:

"Some doctors have expressed the fear that this is merely the beginning of a full-time salaried service. I cannot read into the mind of any future Minister or prophesy what may be done by future Governments, but that is not our intention. Our intention is that the main source of a doctor's remuneration shall be by capitation."

This statement is reflected in the remuneration now proposed. It should be remembered that the new Act gives no more power to impose a full-time salaried service than does the existing law. A full-time salaried service has been possible under existing legislation for some 36 years—but doctors have not apparently feared it. It should also be remembered that the proposed £300 "fixed" element in payment does not in any way affect the prospects of a full salary system; that could be brought about with or without this £300 element, which makes no difference.

The values of the "fixed" payment of £300 in the total remuneration are (*a*) that it enables beginners to live while they attract patients, (*b*) that it affords a convenient fixed peg on which to hang additional payments (e.g., for sparsely populated areas) without the administrative complications of a varying capitation rate, and (*c*) that it reduces the temptation to try to build up excessively long patient lists.

2. *Could not the purposes of the basic salary be fulfilled by an alternative capitation fee (if necessary on a sliding scale) offered to those practitioners who opt for it?*

A system of alternative capitation fees would involve substantial administrative difficulties, particularly if "collective responsibility" and a pooled capitation fund are—as they are—to be accepted. Nor would the purposes above be fulfilled. No good case has been made out for it so far.

3. *Will the Minister amplify his statement that the doctor retains "his ordinary legal right to go to the courts on grounds of unlawful action by the Minister or others" and indicate how far this will give doctors the assurance of protection, where necessary, by the courts?*

There has been general misunderstanding on this. The business of the courts is to decide whether a termination of any form of employment is lawful or unlawful. On this the doctor, like everyone else, can still go to the courts. Any person affected by a decision of the Minister can go to the High Court on the question whether the Minister has, or has not, acted lawfully. Nobody, in any other profession or vocation, has the right to ask a court to reverse a perfectly lawful decision to terminate an engagement. No such right—indeed, no independent tribunal—has existed under National Health Insurance in the last 36 years. The Minister could have carried on the present system of that scheme, but—on the doctor's behalf—he provided for the decision to be taken by a separate tribunal and not by him. The appeal to him is only an appeal to keep the doctor in the service in spite of the tribunal. There is no power in him to alter a decision of the tribunal favourable to the doctors.

Let it be clear what the doctors' protection is. First, the Minister himself cannot ever remove any doctor's name from the list. Locally an executive council comes to the conclusion that the continued inclusion of a certain doctor in the lists would prejudice the efficiency of the service. That council is itself half professional and has seven doctors on it. That council, nevertheless, cannot remove the doctor's name from the list; it can only refer the case to a special tribunal of one doctor, one lawyer (appointed by the Lord Chancellor, not the Minister), and one layman. That tribunal can decide in favour of the doctor—in which event nobody at all can overrule it. Or it can decide against him—in which case he has the further recourse to the Minister, mentioned in the last paragraph. The Minister can uphold the tribunal's decision, or reverse it in the doctor's favour—nothing else. There are many who think it is, if anything, the public rather than the doctor who might claim to be more protected.

4. *For the practitioner, what advantages are there in having his case heard by the tribunal rather than a court of law? Could not the advantages of the two forms of hearing be combined by allowing appeal from the tribunal to a court?*

Part of the answer is given above. The courts' proper function is to decide whether what is done is lawfully done. That remains. Under the existing National Health Insurance it is the Minister who decides these cases. Under the proposed new service an independent tribunal is set up to decide it, and unless the doctor wishes otherwise the proceedings are private. The Minister can reverse that tribunal's decision only in the doctor's favour.

5. *It has been suggested that the chairman of the tribunal, nominated by the Lord Chancellor, should be a judge. Would the Minister consider the appointment of judges as chairmen of tribunals?*

As the Act stands, this is not possible. The Minister sees no good reason to amend it in this respect. A judge, so appointed, would not be acting as a judge, and the difference is more apparent than real. Nor is it easy to find judges available to give the time to this. What matters is that the chairman should be a lawyer of acknowledged standing, and this it is the intention to secure.

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6. *Could not steps be taken, in advance, to clarify the legal position of partnerships after the appointed day?*

The Minister is in complete sympathy with the doctor in partnership who feels that his position under his partnership agreement is uncertain. He is advised that legally the situation is all right and the partner protected. The B.M.A. is advised otherwise. The Minister is anxious to clarify the position but—on the present legal opinions—it is not easy to do so. He therefore proposes to obtain a collective legal opinion of high standing by appointing, straightway, a committee of legal experts to say whether or not the partner in an existing partnership is fully and adequately protected. He would like the profession's coöperation in the selection of that committee. He will consider its report and, if there is evidence that existing partnerships are unfairly prejudiced by the Act, he will proceed at once to seek an amendment of it.

7. *Will the Minister comment on the statement that in the middle and higher ranges his proposals for remuneration do not tally with the recommendations of the Spens Committee?*

His intention has certainly been that they should tally. But, at this stage, no exact comparison has been possible. So far, he has published only the main and fundamental remuneration of the general practitioner. Account has still to be taken of additional factors which have not yet been settled—such as additional payments for maternity services, grants for training assistants, income derived from the employment of assistants in the bigger practices, the value of the Exchequer contributions to superannuation (which the Spens Committee said must be taken into account and which will amount to 8% of the net income) and of the right to a widow's pension.

8. *If the "appointed day" for the operation of the National Health Service Act were again postponed, would National Health Insurance continue until that day?*

No. The National Health Insurance Acts are repealed not by the National Health Service Act but by the National Insurance Act, which operates from July 5.

9. *Will the Minister explain why in his opinion further postponement of the introduction of the service, or of the general practitioner part of it, would be contrary to the public interest?*

Since 1942, under different Governments, the conception of a national and comprehensive health service has been actively pursued. The present Government put it into effect, and Parliament endorsed it, in 1946. It is time that the people had it. The old system is partial and, from the national point of view, not effective enough. The country can have—and should have—the complete cover for health which they deserve. Parliament has decided how they can best have it. It is the Minister's duty to carry out that decision, and he is doing so. He has preserved all the confidential and personal relationships of doctor and patient which are essential to any health care, the freedom of choice of doctor and freedom to change. He has tried to remove the financial worry of health care by a system of pooling costs and drawing benefit when the need arises. To withdraw the general-practitioner service would be to remove from the new health "cover" the very first line of medical consultation. Why should the people wait longer? For his part, the Minister will give them the service on July 5.

BACKGROUND

THE National Health Service planned by the present Government owes much to the activities of bodies, official and unofficial, which in the past thirty years have surveyed the country's medical organisation with three principal purposes in mind: (1) the extension of National Health Insurance benefits to a larger section of the population (the income-limit for participation has, since 1942, been £420 a year); (2) an increase in the scope of these benefits; and (3) closer integration of medical services and particularly of hospital services.

During the late war the movement towards an improved and extended health service gained added impetus; and in 1942 this was brought to the immediate attention of Parliament by Sir William Beveridge's report on social insurance. The recommendations in this report are largely reflected in the Family Allowance Act, which came into operation last year, and in the National Health Service Act, the National Insurance Acts, and the National Assistance Bill, all of which the Government intend to bring into operation on July 5.

ORIGINS OF REFORM

The Dawson Report

In 1919 the then Minister of Health, Dr. Christopher Addison, set up a consultative council, under the chairmanship of Lord Dawson of Penn, to consider "the systematised provision of . . . medical and allied services." In their report[1] the council recommended a regional medical organisation in which "primary health centres" (district hospitals) subserved a related secondary centre (general hospital), which in turn was to be based on a teaching hospital. Normally practitioners were to practise from private consulting-rooms, but "collective surgeries might with advantage be tried," and by arrangement with the health authority doctors might obtain consulting-rooms at a primary centre. The proposed health authorities were to be constituted to include representation by the medical profession, and local medical advisory councils were to work in association with them.

Royal Commission on National Health Insurance

This commission, appointed in 1924, recommended[2] extension of medical benefit in the form of: (1) expert medical advice and treatment for patients who could travel to meet the specialist; (2) expert advice for patients who were unable to travel; and (3) laboratory services. The commission urged that insurance committees be abolished and their duties transferred to committees of the appropriate local authorities, which should possibly contain a proportion of coöpted members.

British Medical Association

In 1938 the association announced a scheme for a general medical service[3] which incorporated many recommendations advanced nine years previously. Medical benefit under National Health Insurance should, it was suggested, be extended to: (I) the dependants of insured persons; (2) those receiving domiciliary medical

1. Ministry of Health: Interim Report on the Future Provision of Medical and Allied Services. H.M. Stationery Office. 1920.
2. Cmd. 2596. H.M. Stationery Office. 1926.
3. *Brit. med. J.* 1938, i, suppl. p. 253.

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attendance through public-assistance machinery; and (3) others of like economic status with the insured persons though not under a "contract of service," and their dependants. These proposals were made on the assumption that "a satisfactory general medical service can be built up on the basis of the extension to dependants of the type of provision the national health insurance system makes, and by the enlargement of the content of statutory medical benefit."

Medical Planning Commission

In 1942 an interim report [4] was published by this commission, on which was represented the British Medical Association, the Royal Colleges, the Royal Scottish Corporations, and other professional bodies. The commission recommended the establishment of a central authority to be concerned solely with all the civilian medical and auxiliary services. "This authority may be a Government department in the usual sense or it may be a corporate body formed under Government auspices and responsible through a Minister to Parliament"; and if the departmental method were adopted, there should be either a Central Medical Advisory Committee to advise the Minister, or a Central Medical Services Board with both advisory and executive functions. The central health authority would formulate policy, decide terms and conditions of service, and control and administer funds.

The duties of the local authority should be purely administrative; and new local-authority areas should be created with a population of not less than 500,000. The new "regional authorities" should be required to delegate the administration of health services to a committee or committees "containing non-elected members with knowledge and experience of such matters, including an adequate representation of the medical profession." In relation to each regional authority an advisory medical committee was to be established by statute.

The alternative would be to set up regional councils, representative of the local authority or authorities in the region and including nominees of the central authority, representatives of voluntary hospitals, and an adequate representation of the medical profession. These councils would have executive powers and a certain measure of financial control, and they would have direct access to the central authority.

The commission held that the unit of hospital administration should be the region; and the higher administration of hospital services should be the province of the regional council or authority, which would be advised on all professional problems by a medical committee appointed by the doctors in the area. Remuneration of consultants and specialists would be by salary, without, however, implying whole-time appointments. All hospitals should have "medical committees composed of the medical staffs above a certain grade and these committees should have direct access to the Hospital Committee of the authority or to the management of the hospital as the case may be."

> "It is recommended that a State scheme of medical service should be provided for all persons with incomes within the current National Health Insurance limits and for their dependants, in effect for about 90% of the population."

Of general practice the commission observed: "Greater efficiency and economy would be secured and less expense incurred if groups of practitioners would coöperate to conduct a single centre" provided or approved by the regional authority. Patients should be able to choose their own centres and their own doctors. The medical staff would consist of a number of principals and assistants, each principal having his own list of persons who selected him; assistants would be appointed to the centre and not to an individual principal. Remuneration would be directly from public funds, and the sale and purchase of practices by practitioners within the scheme would cease. Remuneration of a principal would consist of three parts:

1. A basic salary with special additions for special qualifications and length of service;
2. A capitation fee related to the number of persons or families on his list; and
3. Any fees received in respect of services not covered by the capitation fee, whether undertaken at the centre or not, and any salary received for work outside the scope of the service.

Medical Planning Research

The interim report of Medical Planning Research [5] also spoke for a comprehensive service. The report accorded with the recommendation of the Medical Planning Commission that remuneration of practitioners should be by basic salary and capitation fee, with separate fees for special work.

Beveridge Report

Sir William Beveridge's plan for social security [6] was based on three assumptions, one of which was the development of comprehensive health and rehabilitation services. Every citizen should have "whatever medical treatment he requires, in whatever form he requires it, domiciliary or institutional, general, specialist, or consultant," and including provision of dental, ophthalmic, and surgical appliances, nursing, midwifery, and rehabilitation after accidents.

THE WHITE-PAPER AND AFTER

In 1944 the Coalition Government published a white-paper [7] setting out a plan for a comprehensive service, which was to be open to all who wished to participate. Ultimate responsibility was to be vested in the Minister of Health, at whose side there would be a professional and expert advisory body—the Central Health Services Council. Locally the service would be administered mainly by joint boards formed by county and county-borough councils; and each of the joint authorities was to be assisted by a consultative body to be called the local health services council. These joint boards would take over local-authority hospitals, while voluntary hospitals would participate, if willing, as autonomous and contracting agencies.

General practice was to be organised in the main centrally by the Minister of Health; and much of the day-to-day administration was to be in the hands of a Central Medical Board which, to ensure proper distribution of doctors, would have power to prevent the taking over of an existing public practice or the setting up of a new public practice in an "over-doctored" area. Doctors engaged in health-centre practice were to be remunerated by salary or the equivalent, while those in "separate" practice would normally be paid by capitation fees. Compensation was to be payable to any doctor losing the value of his practice by entering a health centre or because he was prohibited from selling his practice on the ground that the area was "over-doctored."

This plan was substantially modified by a new Minister of Health who abandoned the proposal for joint authorities in favour of regional organisations, centred on the medical schools and controlled by regional councils which were to have an expert rather than a representative membership. The new bodies at regional and area levels were to be purely advisory, so the Minister of Health would become directly responsible for services throughout

4. *Brit. med. J.* 1942, i, 743.

5. *Lancet*, suppl. Nov. 21, 1942.
6. Social Insurance and Allied Services: Report by Sir William Beveridge. Cmd. 6404. H.M. Stationery Office. 1942.
7. A National Health Service. Cmd. 6502. H.M. Stationery Office. 1944.

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the country. The ownership of voluntary and local-authority hospitals was to remain unchanged.

Professional Opinion

To test medical opinion of the white-paper proposals the British Medical Association issued a questionary to 53,728 doctors, of whom 25,435 replied.[8] Of these:

57% considered it reasonable that the proposed Central Medical Board should refuse to permit doctors to take over or start a public-service practice in an "over-doctored" area.

On remuneration in health-centre practice, 28% voted for payment by salary, 34% for payment by a small basic salary plus capitation fees, 23% for payment by capitation fees, and 6% for payment by pooling of capitation fees.

On remuneration in "separate" practice, 15% voted for payment by salary, 35% for payment by small basic salary plus capitation fees, and 44% for payment by capitation fees.

To the question "Do you think that the sale and purchase of publicly remunerated practices should continue or cease?," 33% replied "continue," 52% replied "cease," and 13% replied "don't know."

To the further question whether the principle that all general practices may be sold and purchased should be preserved, 56% answered that it should be abandoned, and 33% that it should be preserved, while 10% said "don't know."

THE ACT

Under the National Health Service Act central control by the Minister of Health, aided by a Central Health Services Council and other advisory bodies, is similar to that proposed in the white-paper. The service is divided into three sections (hospitals, general medical services, and local-authority services) which are to be organised locally with parallel consultation but direct responsibility to the central authority. Executive power is delegated to bodies usually nominated by the Minister after consultation.

The regional organisation of hospitals, now adopted, has been repeatedly advocated; but in empowering the Minister to take over all hospitals, municipal and voluntary, the Act goes further than earlier plans.

Under the Act the duties of local authorities are reduced; they become responsible for health-centre buildings but lose their hospitals and some other functions, including provision for tuberculosis and venereal diseases, to the regional hospital boards.

General practitioners lose the right to buy and sell practices; and the Minister proposes that they shall be remunerated by a small basic salary plus capitation fees.

Professional Opinion

At the end of 1946 the British Medical Association held a plebiscite to determine whether the medical profession favoured negotiation with the Minister over the terms of service under the Act. Replies [9] were received from 42,123 doctors, of whom 54% were opposed to negotiation. Classified by the number of years since qualification (and excluding 674 where this was not stated), the voting against negotiation was as follows:

No. of years since qualification	0–7	8–14	15–21	22 and over
Civilians and Services voting "no"	48%	48%	56%	59%

8. *Brit. med. J.* 1944, ii, suppl. p. 25.
9. See *Lancet*, 1947, i, 76.

THE PLEBISCITE.—The British Medical Association has sent to every doctor three documents: (1) the council's analysis of the Minister of Health's reply to the Negotiating Committee's case; (2) a diagram illustrating the administrative machinery of the new service; and (3) a copy of last week's leading article in the *British Medical Journal*.

In a statement which is being issued to all doctors the Medical Practitioners' Union advises doctors to join the service on the appointed day, to say that they propose to join, and to advise every colleague to join. The change-over to a State service, was, the union suggests, inevitable, because the people welcomed it, the profession recognised the need for it, and no political party dared to support its postponement.

Modern Hospitals

IV

HOSPITALS IN THE UNITED STATES

C. T. MAITLAND
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A PRINCIPAL MEDICAL OFFICER, MINISTRY OF HEALTH

THE hospitals of any great country, like its other institutions, reflect the national characteristics. It has been said of American hospitals at their best that they are outstanding in mechanical excellence and technical efficiency, but are not much interested in what is going on outside. Enterprising individualism in promotion, inventive and even grandiose mechanism in construction, and standardising business methods in management are their notable qualities, more or less and for better or worse. That unique reference hospital, the Mayo Clinic, with its skyscraper towering in the centre of a country town, is an exquisite example.

FORMATIVE INFLUENCES

American hospitals have almost all been built and maintained to meet a local need, and largely by voluntary bodies. In the United Kingdom and generally on the continent of Europe almost all hospitals in their origin were eleemosynary and their services organised for the indigent. But in the United States (except in the long-settled cities on the eastern seaboard) they were for the ordinary citizens able and willing to pay for hospital care for themselves and their families, and located where revenue derived from patients would be sufficient to ensure their continuation. This basis of payment for service by persons of independence and free choice is reflected in some of the most characteristic features of American hospitals. There are also, it should be added, public-owned hospitals including some general hospitals in the large cities, mental and tuberculosis institutions belonging to the States, and veterans' and Forces' hospitals belonging to the federal government.

The vastness of the country, the distances separating the great centres, the cultural differences between the numerous sovereign States, the high proportion of persons living in small towns and thinly populated countryside—these have at the same time fostered local initiative and made exceptional demands on it. The great problem has been how to get a reasonable standard of medical care to the people in the rural areas. Not more than a third of the country lies within a radius of 200 miles of a teaching hospital; the greater number of hospitals have come into being in small-town and rural areas, yet "facilities and skills have pyramided in the wealthier and more urban communities." [1] At one end of the scale in many of the cities are splendid individual institutions, strongly staffed, and at the other end are numerous small country hospitals without specialist resources.

"We have finer institutions in America, more hospital beds per unit of population and higher standards of service than are to be found in any other country. However there are many regions in the United States in which hospital service is quite inadequate and in some areas it is badly lacking. We frequently refer to our splendid *system* of hospitals, whereas there actually is none. There is very little co-ordination between our hospitals. In most States anyone can establish the most meagre facility for the bed care of the sick and call it a hospital." [2]

VOLUNTARY WORK

Powerful voluntary movements of a characteristically American sort have arisen to raise the average standard of performance by improving the quality of professional care and of administration in individual hospitals throughout the country.

1. Health Service Areas. Public Health Bulletin no. 292. U.S. Public Health Service, Washington.
2. American Hospital Association: Hospital Review 1945.

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The American College of Surgeons began in 1918 to inspect with consent and publish annually a list of hospitals attaining minimum standards. These include an organised medical staff individually competent that have adopted approved rules and regulations which inter alia specifically require monthly staff meetings to review clinical experience and the writing of accurate and complete medical records; also adequate diagnostic and therapeutic facilities. In 1944 of 3911 hospitals under survey, 70·8% were approved and 10% were provisionally approved.

The system of National Speciality Boards promoted by the American Medical Association which designates individuals as specialists within some dozen clinical subjects has provided hospital managements with fields of approved staff candidates. The association has been enabled indirectly to improve the quality of hospital practice through its function of approving resident medical appointments at hospitals in accordance with published standards.

In the New England States the Bingham associates have demonstrated the value of linking a specialist staff based on a major medical centre—in this case Boston—with small-town hospitals in the region.

The Commonwealth Fund has studied rural hospital needs and has built and subsidised small hospitals in many parts of the country to demonstrate what standards of care and medical treatment can be attained in enlightened communities. The fund has more recently begun to assist in promoting the regional organisation of hospitals.

The W. K. Kellogg Foundation has sought to improve undergraduate and postgraduate medical education by decentralising a part of the instruction of medical students and interns from university hospitals to district and local hospitals. Such an arrangement, properly controlled, can hardly fail to improve the standards of medical treatment at the associated hospitals. A promising scheme has been worked out which is based on the university hospital of Michigan University at Ann Arbor.

The American Hospital Association exercises great educative influence—in part through conferences and professional and technical literature. Through it was appointed in 1943 a strong Commission on Hospital Care which has been engaged on a national study of hospital services and the formulation by States of a national coördinated hospital plan. The pilot study was undertaken in the State of Michigan.

New York supplies an outstanding example of local survey and planning. The Hospital Council of Greater New York, which replaced a body established in 1935 by Mayor La Guardia, has prepared a master plan for hospitals and related facilities. This is based on a hospital survey and the detailed study of forty-one natural communities into which could be divided the city's area of 365 square miles with a population of some 8 million persons. The plan favours the designation of hospitals of three orders—community, regional, and central. The council is advisory and not operative though it has been designated by the New York State legislature as the clearing agency for hospital survey and planning.

LEGISLATION

The federal government has in recent years taken an increasing and direct interest in health matters. The Social Security Act of 1935, making appropriations to the States for general public-health and maternity and child-welfare work, was a milestone. Authoritative testimony on the nation-wide distribution, utilisation, needs, and planning of hospitals has been presented during investigations by the Senate into the educational and physical fitness of the civilian population. The Wagner-Murray-Dingle Bill sought to lay on the federal government permanent major responsibilities for hospital provision and maintenance. The United States public-health service in its division of States' relations has been increasingly concerned with the study of medical care through hospitals and with hospital provision, planning, and coördination.

An official monograph on health service areas [1] summarises the nation-wide need for hospitals. It gives estimates of the requirements of each of the States of the Union for general hospitals and health centres, and although these are necessarily arbitrary the document is nevertheless a remarkable library product.

The Hospital Survey and Construction Act recently passed by Congress provides for large appropriations for approved capital expenditure by the States on hospital construction, following State hospital surveys and the drafting of long-term plans of hospital development.

THE HOSPITAL INDUSTRY

In the United States sick persons have generally paid separately for care and for medical treatment in hospitals. The management of hospitals and the practice of medicine in hospitals have therefore developed as separate though complementary activities. The hospital has been regarded by providers and users alike as an hotel or an inn for sick persons—often indeed for persons who choose to go there whether or not they are really in need of medical treatment in hospital. The medical practitioner has generally encouraged this point of view. He has wished to enter the hospital to render service to his own patients on payment as part of his private practice. The hospital as such has not provided medical service but has permitted the entry of the entrepreneur "attending physician" to treat its guests. For the practitioner it has provided diagnostic and treatment facilities, for the patient a "floor service" of nurses.

The provision and management of hospitals in the United States has thus been widely thought of as part of the world of business. In the preface of the admirable 1945 review of the American Hospital Association we read:

> "Civilian hospitals represent an industry conservatively valued at four billion dollars which provides employment to seven hundred thousand persons with a yearly payroll of nearly seven hundred million dollars."

The increasing cost of hospital care has encouraged the growth of insurance schemes operated by over eight hundred commercial and other insurance companies. In early 1946 nearly 30 million persons were covered by insurance for hospital service, excluding medical treatment. The Blue Cross organisation links over eighty non-profit schemes, known as "plans," which provide cover for about 20 million subscribers. Insurance against costs of medical treatment in hospital has developed more slowly. At that date about 12 million persons were covered for at least some part of medical treatment—generally surgery and obstetrics.

Able members of the medical profession in America have as a rule been more interested in technical success than in community leadership, and so have left the chief influence in the hospital world to business men including life insurance salesmen and other specialists in business method. This is another reason why business values and techniques have often been given pride of place in hospital organisation and administration both by boards of management and their executives. Thus is sought, and broadly speaking realised, that kind of efficiency and those standards of achievement that are necessary in an industrial concern. But the weakness of a dominant business administration is that personal values tend to be subordinated to impersonal or material values. The passion is for short-term results, particularly those that can be stated numerically, rather than for that long-term thing, human growth, that defies direct measurement. For that reason it is a safeguard when administration in the hospital is in the hands of a medical man. It is easier for an administrator to carry the humane values into his work when his training has been in the humanities and his interest has been people, such as a generous professional education and experience can give. That is why the "doctor," given an aptitude for administration, is likely to make a better administrator of hospital affairs than the lay business-trained executive. In addition there is the constructive value of his professional knowledge of the needs of medical practice and nursing care. In the United States there are eminent

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medical hospital administrators, and it is greatly to be hoped that their race will be continued.

The business emphasis in the hospital world is reflected in construction and equipment as well as in working arrangements, and generally these may be said to favour the administrator rather than the clinician.

INTERNAL ORGANISATION

Separate special hospitals have not been commonly provided in the United States as in this country. The administrator has sought to avoid the loss of flexibility in use of space, and the risk of waste of the staff's time which often follows the permanent segregation of patients by clinical type, whether in designated wards of general hospitals or in separate institutions. This practice has accorded with the desire of medical practitioners to be able to treat their own patients with any kind of disease in hospital if they so wish. The trend is now towards the development of clinical units within the same hospital.

The breakdown of the responsibility delegated by the boards of management to the hospital superintendent or director (whether medical or lay) into the hands of heads of departments appears to the overseas visitor to be more clear-cut than in this country. These will include the office manager, the chief nurse (who may be called director of nursing), the housekeeper, the dietitian, the hospital engineer, and the laundry manager. As an example, the chief nurse is generally responsible only for nursing and nurses' training, and does not undertake other duties often assigned in Britain to hospital matrons. Much attention is paid to the technical problems of the dietary department, both in planning and working, such as the placement of the kitchens whether at the bottom or at the top of multi-story buildings, and the method of distribution and service of food whether centralised or decentralised. It may be mentioned that the tray service from kitchen to patient tried in some hospitals has not justified expectations; the dependence on complex travelling-belt mechanism is only one reason why there has been a recoil from completely centralised food service.

In hospital work generally the observer notices the freer employment of clerks whether to assist members of the administrative staff or the clinicians, as in the consultative clinics. In some hospitals a "ward secretary" or clerk assists in each ward unit, dealing with all the paper work that does not require to be handled by a doctor or a nurse, including the filling up of forms such as drugs and ward linen orders, telephoning, and other non-professional duties. Some hospital administrators and directors of nursing prefer not to have such lay workers in the wards because they think that their duties are for the most part better performed by nurses, or because the advantages do not justify the additional cost to the payroll, or because of fear of leakage of confidential information.

An interesting application of the principle of concentration of routine day-to-day work in the hospital field proper is central surgical supply.

Many hospitals now bring together in one section the preparation of sterilised dressings and equipment required in all wards and other departments and the cleansing and storage of such equipment after use. The section issues all dressings, solutions, and equipment made up and ready for use. The rooms provided are sometimes in the basement or they may be near the operating suite high in the building. The staff consists of a permanent nucleus of two or more qualified nurses, generally assisted by a variable number of student nurses, each spending a period of weeks in the section and being trained in work which would otherwise have had to be learned in the wards with their lesser facilities. For central supply it is claimed that less equipment is required, that storage (particularly of rubber goods) is better, that the training of the student nurses in the techniques involved is more efficient, and that asepsis is more certainly assured. Central supply does not usually serve the operating-rooms. A 24-hour service is provided in hospitals with training schools.

(To be concluded)

In England Now

A Running Commentary by Peripatetic Correspondents

DOES it really pay to be reasonable and considerate to subordinates? I've just been talking to a colleague who believes that rude surgeons get what they want because they treat nurses rough, throw instruments at them, and demand everything just so. My friend, a good-mannered physician, treats nurses with courtesy and consideration, and thinks he gets less attention in consequence. There's a lot in what he says. I've heard nurses talking with awe and respect of the whims and caprices of the mighty, but never heard them praising the kindnesses of the courteous.

As a student I remember having the same sort of reverence. It's really natural enough to enjoy a bit of pomp and panoply—and we used to get it. Old Dr. Lubbdup used to arrive at hospital in an enormous Rolls, working out some problem on a piece of paper, and when the porters opened his car door he took no notice but remained immersed in his calculation while everyone waited. He also used to stop in a corridor while progressing with his full entourage and teach lengthily, oblivious of those who were trying to get past with trolleys. The late Sir Apex Beat was wont to pluck a daffodil from the patient's bedside flower vase and point out interesting points on a chart with the dripping stem, the trickling water ruining the chart; all of us reverently realised it would take the nurses at least half an hour to write it out again. Surgeons, of course, have more scope for individual peculiarities and can arrive with special gowns, demand special instruments, and so forth. Anæsthetists too can gratify their audiences by various whims. Old Dr. Blue would not anæsthetise any patient with painted toenails, but I always admired the late Sir Ether Drip who would insist on wearing white kid gloves when giving an anæsthetic.

Taking it all round, I think chiefs are now more reasonable, more approachable, and less eccentric than they used to be, but I for one find them less entertaining.

* * * *

Our hospital staff is suffering from an outbreak of the American pandemic disease *Polychromia focalis*.* The senior surgeon had a mild attack when he returned from a Canadian trip early last year, but it did not arouse much attention for at that time neither the pathology nor the infectiousness were recognised. Then in the summer the gynæcologist achieved a long-held ambition and got himself sent to the United States on a mission. In his itinerary he managed to include Coney Island, Saratoga, Atlantic City, Tia Juana, and Los Angeles (we don't know how) and thus visited some of the worst infected areas. In addition he addressed several women's clubs in Kansas and Iowa, so it is not surprising that he returned with an acute form of the disease. His attack has persisted and indeed is now at its worst, for all the cases in the hospital showed a sharp exacerbation just after Christmas. His patients were startled at first, but the final effect has been decidedly euphoric, in contrast with the dysphoric reaction of his male colleagues. His patients' approval has merely accentuated the exalted self-satisfaction and absence of pudor which are pathognomonic of the advanced case. The æsthetic sense is quite blunted and in this instance the prognosis offers little hope.

Contact cases began to appear just after the gynæcologist's return to England. As was to be expected the younger members of the staff were attacked first and displayed aggravated forms of the disorder. Some of the older and more staid men also succumbed but in a milder manner. The E.N.T. man already had complete chromatodysopia, and in consequence the disease manifested itself as a dysmorphæsthesia—a symptom, of course, which occurs in the classical case but to a less marked degree.

The complete psychopathology of *Polychromia focalis* has yet to be fully explored. It is mainly found in extrovert males from 15 to 35, in whom it seems to be linked with a strongly positive reaction to the other sex. But cases have been noted in introverts whose ambitions have been severely suppressed either unconsciously or

* *Focale*, a neck-cloth or cravat.

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by the hand of external authority. These patients are difficult to distinguish from those who deliberately assume the disorder so that it may be thought that they too have been on a mission to the United States.

* * *

Give me a drink, someone. I know all. I take it all back, all the unjust and intemperate comment in which I once used to project my inadequacies against the people who examined and failed me. This week I marked my first examination paper. Now I understand.

They can go through all that, sustained it is true by handsome fees, but they can survive it and keep on examining. Some of them even keep their faith in human nature. I've never given them their due, having seen them always from the candidate's viewpoint—I, Prometheus against odds; they, the nasty chorus of the *Dynasts*, the accomplices of Zeus, the medical but unmerited Eumenides. Now I can share their sorrows. Phlorizin, florrhisin, plorisdin, phlorrhysin—and the loop of Henley (on Thames).

I don't know what the standard of literacy among office-boys and costermongers is, but I am sure that given a bottle clearly labelled *Pilocarpine* they would abstain from writing pylocaphone three times running. I doubt if they spell breast "brest," or believe that substances are detoxificated. And they, of course, are not aspirants to a learned profession wielding vast powers of life and death. Nobody's darling will hang suspended on their quavering or intemperate fountain-pen. If all these bizarre orthographies, barbed-wire, earwig-footprint, or unadulterated doodle, will one day embody prescriptions for things like curare, I'm off. I couldn't even like the courage of the warrior who consistently writes that a gland prods a hormone and a hormone prods an effect (not even the newspapers have got homicide down to hom., and even DON AMOK WITH AX, 6 DEAD is music in my ear after this). As to the lower levels of orthography, I never could make much of Rorschach blots.

And how the glimmer of intelligence swells, in all this circumambivagation, to a lighthouse, and gets undeserved marks! I even ended by giving marks for unintentional humour: for the statement that ovulation can be timed by bimanual examination of the monkey, or that most lower invertebrates are homosexual. Or for sheer effrontery, a good medical asset, in having sent the paper in at all.

Odd, too, that in a few years these folk will be quite competent doctors. That *we* looked like this once. Give me a drink, someone.

* * *

I went with my wife the other day to a feast at the mortuary on the occasion of the marriage of the office-boy, who lives on the premises. We, the only Europeans present, were guests of honour. It being a well-known fact that no Englishman ever goes out at night except to dance and drink whisky, a four-piece combination of native instruments laboriously interpreted "The Lambeth Walk" and "Red Sails in the Sunset" while I and the missus solemnly fox-trotted before an awed audience. Our second requirement was met by a bottle labelled: "Union Jack Brandy. Made specially to be drunk with soda water. Produce of Bordeaux." Produce of sawdust, I rather fancy.

* * *

Surely attribution is one of the worst thieves of time. How many clinician-hours are wasted in listening to the patient's own theories of why it happened, when it is what has happened that we are trying to find? Nevertheless, patience is sometimes rewarded as it was when I asked an elderly countrywoman how her bacterial endocarditis had begun. The Northumbrian accent must be supplied by those fortunate enough to have heard it.

"Well, it was like this, doctor. A friend of mine died and we all went to the cremation at Newcastle. After the service was over we came out and just as I turned to look at the chimney a puff of smoke came out. 'O God, there she goes!' I cried, and I felt my heart turn over and I've never been right since."

* * *

Notice in a government doctor's clinic: "Patrons are respectfully reminded that we, too, often feel far from well."

Letters to the Editor

TO THOSE UNDER FORTY-FIVE

SIR,—May I put before all doctors under 45, domiciliary or institutional, reasons why they should come into the National Health Service willingly from the start? I do not speak to those over 45, though I think it will be to their advantage, and to that of the public, if they do. I speak to those who will have time to readjust their lives and to those who have to consider whether there is to be a career for them outside the service. The chance of a large income? Perhaps—for a very few. Big private practices will not be many in a poor country; and while they last they will be held by seniors and by those who had to stay at home. But careers are no longer estimated in gross takings, and the best opportunities to do good work will lie inside the service.

We are to be nationalised. Let us face it. As were the sailors and soldiers some 300 years ago. Have the officers of the Navy and the Army had so poor a time? Have they been so inefficient?

I have been through it all from the beginning. When the National Health Insurance Bill was introduced in 1911 it was presented not as a complete remedy but as a foundation on which a complete superstructure could be built. The National Health Service is that superstructure. It has been a part of the national policy for nearly 40 years.

My teacher, Dr. Lauriston Shaw, was one of those who at that time took a lead in the discussions and got almost all they asked for; and then Dr. Shaw and his friends were turned out by those who wanted more. They did not get it; but instead of bringing members of the profession into the partial scheme contentedly they brought them in as a discontented opposition that took 20 years to work harmoniously. History is repeating itself. It is said that much of the Act as it now stands is the work of the medical profession, as a result of the labours of the Negotiating Committee and of the B.M.A. before that was formed. Again they got most of what was wanted. Again those who were willing to accept the Act were turned out—or found it necessary to resign, the accounts vary—because some wanted to continue in opposition.

It is one thing to oppose every clause of a Bill: it is another to oppose the will of the nation embodied in an Act. Let us hope that history will not continue to repeat itself. In 1911–12 a boycott of the service was organised. Nearly all the profession said they would not join; and nearly all affected did so. When the terms were being reconsidered in or about 1922 a strike was organised on the same lines. Nearly all the doctors on the panel said they would no longer take service; and then again nearly all did. Now the same thing is being organised again. It will fail again—not because we doctors "have no guts," are "inclined to rat," or "have no feelings of communal action," but because most of the profession will realise that, now the superstructure to the original scheme of 1911 has been built, to come into it is the only way to ensure that the majority of the people shall receive adequate medical care.

The main point of contention seems to be the question of a salary for part of the payment of that half of the profession (or less) who will serve in the domiciliary branch. The Government want doctors to have security for a part of their income; the Negotiating Committee do not. Well, I came back from the first war at the age of 37 with a wife and two children to keep on an assured income of £87 10*s*., and I can tell my younger colleagues that some security leads to better work and to a greater happiness. Security for the bread and butter and struggle for the jam seems to me the best way of life, and this the Government's arrangement gives.

Those that come into the service will not have to turn their patients into an investment. Instead they will have a pension. The practitioners of London have always advocated this as part of the terms of service under the N.H.I. Let me give an example from my own experience of the failure of the capital value of a practice to provide an income in old age:

When I was chairman of the London Insurance Committee in 1929 we had to consider striking a practitioner off the

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panel on the ground that he was not fit to continue. I went to visit him. He was a man of 84 who lived in one room and was hardly strong enough to rise from his bed. He had about 150 patients on his panel whom the doctors nearby looked after out of charity to him; and the 30*s*. a week that he got from this service was the whole means of his existence. Needless to say, such a practice was not a saleable commodity; but had a pension scheme been a part of his emoluments from the time when he took the club patients who were finally absorbed into the N.H.I. he might have been living in comfort and relative luxury.

Let me warn the young members of the profession not to sign a document to their own detriment out of a mistaken idea of loyalty to their seniors. The facts that a salary as part payment does not suit men in middle age, and that they have practices to sell, are not reasons for younger men refraining from joining a service that will give them a career, a living, and ease in old age.

Above all there is our duty to our country. Shall we, an honourable profession, during the crisis that had inevitably to follow such an upheaval as that of 1939, do our best to wreck an accepted policy of nearly 40 years that should have been put into being before that upheaval started, and would almost certainly have been fulfilled before now but for it? Let every man who thinks of staying out inquire of himself whether he purposes to put his own desires before the needs of the country. Let him think of how bad an example he may be setting to those very persons into whose houses he is called, and who may not have his advantages of intelligence, of education, and of altruism.

London, W.1. T. B. LAYTON.

HEALTH EXAMINATIONS

SIR,—Dr. Petch (Jan. 10) confuses himself because he thinks of health examinations in terms of curative medicine. Health examinations are a biological exercise, and this being so the patient cannot be divorced from his background. Of course Dr. Petch's experience ended in failure. A health examination is part of an individual study of the physical traits, mental attributes, and emotional balance of the whole patient set against the circumstances of his life. Many other techniques—for example, an accurate account of illness, absence from work, feeding habits, growth, and somatotypes—must be studied and correlated.

Health supervision is only in its beginning; new techniques have to be developed and much research is needed in the application of very exact methods of diagnosis. Health examinations have been undertaken in industry for many years; and their value is not to be doubted. To quote one criterion only: sickness absence, which is a very good index of health and morale, may be greatly reduced by methods which Dr. Petch despises.

Much as I agree with Dr. Macklin and Dr. Parnell (Dec. 27), I wonder why they have not drawn on the experience of industrial medical officers, who for many years have successfully struggled to improve the health of very large numbers of adolescents and young adults.

Southwell, Notts. T. A. LLOYD DAVIES.

SIR,—Dr. Petch's misgivings about routine health examinations are understandable, since they are based on the assumption that conditions in the Army resemble conditions in civil life. But the inference that what was good or bad in the Army will be similarly good or bad in other environments is misleading.

Health examinations of students have a different purpose and involve a different human relationship from those of routine examinations in soldiers. In the age-group dealt with, the risk that undetected major disorders may shortly reveal themselves, to the apparent discredit of the examiner, is very small. The number of minor disorders, untreated but worth treating, is large. They alone may be held to justify routine examinations of students, but the wider purpose of the system is even more important. The mechanical procedure of the physical examination can introduce a personal relationship between the young student and the older doctor which—given wisdom and understanding on the doctor's part—is of great value to the student. As students in their droves pass through our universities the strong personal influences which they experience are those of individual contact with their contemporaries, not with older people; for most of their teachers are remote and impersonal. A good doctor can make the influence of maturity more effective in this play of unbalanced forces. He can advise, warn, reassure, encourage, stimulate; and he can achieve a relationship with the student—thanks largely to the quick and intimate introduction afforded by the physical examination—in which his suggestions are more likely to be heeded than those of most other people. The routine examination may be compulsory, without harm. The rest will grow out of it, voluntary so far as the student is concerned. The doctor here has the opportunity of achieving and exploring an almost ideal doctor-patient relationship.

Department of Medicine,
University of Aberdeen. R. S. AITKEN.

HEALTH AT THE UNIVERSITY

SIR,—Will you allow me to add some facts and suggestions to the excellent letter from Dr. Mayer-Gross in your issue of Jan. 17 on the subject of mental health at the university?

He refers to the recent careful report on mental illness among Army officers [1] which makes serious reading for those unfamiliar with the alarmingly high incidence of psychotic and neurotic illness among members of our profession.

From 1940 to 1943 I was privileged to act as consultant in psychiatry to the Director of Medical Services to the Middle East Forces. During all that period I was constantly being asked to help in disposing of varied and difficult problems presented by doctors serving with all the fighting Forces of many nationalities, Dominion and Allied, friend and foe. Few can know of the time-consuming and often thankless labour demanded in dealing with the disorders of conduct exhibited by these colleagues, ranging from queasiness in action, drug-addiction, and perversion to manic-depressive or schizophrenic illness. I like to think that it was in those hot and thrilling days that Dr. W. W. Roberts became interested in this problem, so disturbing in those years of fighting stress. It was fortunate that when we were posted back to the United Kingdom Dr. Roberts was able to work with Dr. J. N. P. Moore, who was himself collecting exact data on the high incidence of doctors in the delightful officers' wards of the Crichton Royal. They both generously allowed me to quote from their work in an address given in 1945,[2] two years before its publication.

For over twenty years I have been attached as psychiatrist to a teaching hospital and its medical school. During that time it has seemed that requests for psychiatric aid to medical undergraduates have risen steadily. Thus, in 1930 I saw 4, possibly 5, medical students; in 1947, 32, apart from a few (7) who were sent for opinion by colleagues. As Dr. Mayer-Gross says, here is evidence of the need for preventive psychiatry in our own profession. It seems to me that there are three useful lines of approach.

First, would it not be well to record and examine the manifest and latent reasons which decide a large series of men and women to enter the medical profession? Secondly, all medical students should receive the benefit of a careful medical examination before acceptance at medical schools. Such examination would be best carried out by a small board, for which an estimation of the intelligence level of the candidates, measured by one or other of the well-known scales, should be made available beforehand. It would be an advantage if procedure could be standardised at all schools. The board need not have a psychiatrist as member, but doubtful cases would be referred to him for opinion when necessary. Thirdly, the authorities of medical schools might with advantage make it clear that their right of rejection for further training would remain during the whole of the undergraduate career. It has been my experience that students and their parents tend to regard obtaining a qualification as a vested right regardless of continued failure in

1. Roberts, W. W., Moore, J. N. P. *Brit. J. soc. Med.* 1947, **2**, 135.
2. James, G. W. B. Presidential address to the section of psychiatry, Royal Society of Medicine. *Lancet*, 1945, ii, 801.

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examinations and sustained evidence of instability in a psychiatric sense.

Now, Sir, let no reader of this letter think that I suggest our profession is made up of the mentally unstable. Far from it. In war, gallant and distinguished service to our fighting men and our population at home was rendered by a very stable majority. In peace, a visit to any medical school will show that most of its pupils are as industrious and keen as any other group of professional undergraduates. Dr. Mayer-Gross in his letter draws attention to the need for psychological help to students, and I have merely amplified his message with special reference to my own profession.

London, W.1. G. W. B. JAMES.

BIOGRAPHY OF SIR JOSEPH BARCROFT

SIR,—Lady Barcroft and Prof. Henry Barcroft have honoured me by inviting me to write the biography of the late Sir Joseph Barcroft, F.R.S. I have accepted the invitation in the certain belief that I can count on the coöperation of Sir Joseph's numerous colleagues and friends, and I write this letter to enlist their assistance, which will receive full acknowledgment in any consequent publication.

The form which such assistance will take will vary from individual to individual. One may make suggestions as to treatment of the subject, another may provide an anecdote, another may give an instance of Sir Joseph's generous help in research, and so forth—it is not for me, at this stage, to ask for specific information about this or that aspect of Sir Joseph's life and work. I must, however, give a closing date for the receipt of such material, and the date I have in mind is the last day of April, 1948.

I should be grateful if the material could be sent to me at the Department of Physiology, The Medical College of St. Bartholomew's Hospital, Charterhouse Square, London, E.C.1, with clear indications as to whether it is to be returned to the sender or can be retained.

Should I be prevented from writing the biography, I assume that I may hand over any material so received to an alternative author chosen by Lady Barcroft and her son. K. J. FRANKLIN.

ANKYLOSING SPONDYLITIS

SIR,—Dr. Dudley Hart asks in his letter (Jan. 10) if there is any evidence that, as regards kyphosis, the end-results in patients treated by postural methods such as are described in our paper on Jan. 3 are any better than in cases where such treatment has been omitted.

Several of our earlier cases, in which kyphosis had been improved by postural treatment and the condition arrested by X-ray therapy, have been examined one year later. All had maintained their improved posture. It is difficult to believe that these cases could have undone their kyphosis spontaneously.

Belfast. W. LENNON.
Royal Free Hospital, London. I. S. CHALMERS.

NEW ZEALAND HEALTH SERVICE

SIR,—Your annotation on Jan. 3 did not mention that patients commonly pay about 3*s.* for each service rendered, in addition to the 7*s.* 6*d.* paid via the social security tax. If this is the average extra fee, it means another £450 income for the doctor.

Sir Ernest Graham-Little [1] has drawn attention to what he calls the failure of a partial State medical service, and it is therefore instructive to see how successful is a part of the service staffed entirely by salaried public servants. The director of the dental hygiene division, speaking in London recently, said he estimated the total inclusive cost of the school dental service as about £1 per annum for each child under treatment. From the data in the annual reports and information from the director, I have calculated that for this £1 the average child has about five teeth filled and 1 in 3 has one extracted; he is taught how to keep his teeth clean, and his mother is advised about correct feeding; all this takes about three hours of the dental nurse's time. Even critics of this socialised dentistry admit that the work done is of excellent quality, and although much of it is done on the temporary teeth it is obvious that no dentist in private practice would do it nearly so cheaply. Moreover, many could not do it so well at any fee. Practically everyone, including dentists, sends his children to the school clinics.

Salaried service is not the only reason for the scheme's efficiency. The dental hygiene division also trains the nurses, specifically for children's preventive and conservative dentistry, and this career is so popular that candidates for training can be carefully selected. They are not trained or qualified for private practice and so can be retained at economic salaries no matter how prosperous private practice becomes. They work a five-day week and have a total of eight weeks' annual holiday.

Another important point is the central organisation and planning, also admitted to be efficient; the local authorities are only concerned with non-professional matters such as the furnishing of waiting-rooms.

A partial State medical service is better than none, but very expensive. A complete State medical service can be efficient and economical. The proof of this by the New Zealand school dental service has so impressed New Zealand dentists that they have willingly come into the fee-for-service adolescent scheme, clearly understanding that it is to be replaced by a salaried service as soon as possible.

London, N.W.6. R. B. D. STOCKER.

1. *Lancet*, 1947, ii, 109, 452, 670.

INTRAVENOUS CANNULISATION

SIR,—With reference to Dr. Clain's article (Dec. 6) and the letter from Dr. Bromage (Jan. 3), may I suggest an even better needle for intravenous infusion than the West Middlesex? This is the "Guest" needle.

The needle consists of two parts—an outer cannula and an inner hollow needle, the point of which projects just beyond the distal end of the cannula. Its advantages are:

1. Definite entry can be confirmed by the appearance of blood without withdrawing the needle, whereas this is not so with the West Middlesex.
2. Easier and smoother entry may be gained into the vein with the hollow needle.
3. Length of shaft: this ensures that the needle will remain in situ.

London, S.W.3. M. C. JOSEPH.

YOUTH IN AGE

SIR,—The following is a literary-medical query of some interest. "Whom the gods love dies young" was a saying of Menander, according to Plutarch; and Byron (*Don Juan*, canto iv, stanza 12) refers to it thus: "Whom the gods love die young, was said of yore." However, Dr. Arthur Ransome, on a walk with my father, about 1908, gave him the following beautiful, though fanciful, explanation of the saying:

"Whom the gods love die young, so we are told.
The meaning is, they never do grow old.
However long the tale of labours past,
God-given youth is theirs unto the last."

Is the author of these lines known, or were they perhaps by Dr. Arthur Ransome (1834–1922) himself?

London, W.1. F. PARKES WEBER.

MASS RADIOGRAPHY

SIR,—Although I am medical director of a mass-radiography unit, I am in complete agreement with the views expressed by Dr. Hoffstaedt (Dec. 27) and Dr. Stradling (Jan. 10).

This unit is in a city with a population of some 250,000, of which about 150,000 are between the ages of fifteen and sixty-five. This is an industrial city, and up to date the unit has contacted 250 firms with an average response for voluntary chest X-ray examination of 50%.

We have discovered that of every 1000 examined 4·1 have active pulmonary tuberculosis; and of this number 56% have symptoms. One can only surmise the incidence of pulmonary tuberculosis in those who are not radiographed; according to several welfare officers the people who will not come for examination are usually those who ought to come as they have symptoms.

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With regard to gaining the coöperation of the general practitioners, six months ago I contacted the local medical society and asked if a meeting might be devoted to discussing the problems in the early diagnosis of pulmonary tuberculosis and bronchial carcinoma. This request was not even refused; it was completely ignored. In this city there are approximately 130 general practitioners, of whom 12 use the unit frequently and 14 use it occasionally; the remainder have never sent one patient to be radiographed.

Propaganda of every kind ought to be directed towards explaining that it is better to be examined several times unnecessarily than to wait until it is too late.

MEDICAL DIRECTOR.

A LAYMAN LOOKS AT MEDICINE

SIR,—All human beings have two opposed characters, an innate kindliness and a love of power. Man has also a social instinct, which finds its expression in group formation. Unfortunately the pace of the group is set by those whose love of power is most highly developed, and the vast fund of individual kindliness is thereby suppressed and rendered voiceless.

If frustration and disillusion are to be avoided, two questions must be asked of any scheme of social reform: what extent of freedom for the play of individual kindliness does it offer, and what restraints are imposed on group excesses? It is the weakness of the reforming mind, obsessed by present evils, that it does not stop to ask these questions of its own remedies; it stops short at the facile proof that these remedies will cure a particular evil.

Social groups, moreover, are not static. They arise as a response to social needs; not infrequently, perhaps generally, that need is entirely worthy—resistance to gross oppression, or direct service to the community. A spiritual and not a material urge is the motive of the founders. With achievement, however, self-interest takes the place of the spiritual urge, and the group, in its turn, becomes oppressive. Did not the Church itself, with its growing material interests, become one of the worst agents of oppression with the Inquisition?

The medical profession constitutes a well-defined group in the above sense, for it sets its own standards for admission, fixes its own scale of remuneration for services, and judges the professional conduct of its members. True, it arose with the primary object of service, the protection of the community against charlatanism; but it has become a rigid, materialistic group. Can it succeed, where the Church has failed, in avoiding the pitfall of all groups, self-interest? If it has so far avoided the danger, it is because there remains, in the close personal relationship between the general practitioner and his patient, sufficient scope for the play of that individual kindliness which alone can make a stand against group selfishness. That is the key to the situation; and, if that key be lost, abuse of the profession's monopoly is inevitable.

That the profession may lose that key is no vain fear; there is ample evidence of the constant pressure for group authority to assert itself against any individual challenge, whether from within or from without. The opposition met by Lister, Pasteur, and a host of others affords examples. A perusal of the controversies which raged at that time exposes a spirit which went far beyond any desire to protect the community against charlatanism. The group is here seen running true to form—an attempt by those who have secured control to check the dynamism of individuality.

The medical profession, then, has its foot set on the road which leads to group dominance, and the pace will accelerate as the opportunities for the exercise of human kindliness grow less. As with other professions which have already traversed the road, there are not wanting signs of a dim awareness of the dangers ahead.

So much for the past. What of the future? The last word in group formation has not yet been spoken. Already there is arising a super-group of "planners," as surely as unwittingly running true to group form. Conducting its activities behind a façade of self-asserted disinterestedness and "intellectual integrity," this group, at one and the same time, is unconsciously groping for freedom from all responsibility and for power to regulate all humanity. There will be no escape for the medical profession; already the dead hand of the "planner" is apparent in the new National Health Service Act. This Act threatens to sever the last strand linking the general practitioner with his patient and to diminish still further, perhaps to eliminate, the scope for the exercise of individual kindliness. The patient becomes a pawn to be thrust, at the first opportunity, into the maw of an unemotional hospital routine. Nor is the position of the doctor more enviable. It will not, I hope, cause offence—for no offence is intended—to the excellent Army Medical Services to contrast the inertia they exhibit in peace, its routine of formal duty and standardised returns, with the initiative, great heroism, and sympathy towards fellow men shown in action. In the former case the fund of human kindliness is there; the stimulus which will call forth its expression is lacking. Whence, in the dull routine of a monopolistic medical service, supplying "services" much as a multiple store supplies standardised goods, is to come that essential stimulus provided, in the Army, by active service?

Si monumentum requiris, circumspice. Other professions have travelled farther along the monopolistic road and provide a warning against disregarding the weaknesses of human nature.

Cambridge. H. MARTIN-LEAKE.

*** The problem is even more complex than our correspondent suggests; for "innate kindliness" and altruism are part of the social instinct and are expressed only towards members of the same group. We need a continuous expansion of the size of groups so that people feel an obligation not only towards their own section, or even their own nation, but towards all mankind. Suppression of individuality within the group is an eternal danger, and a National Health Service, like any other organisation, might develop along authoritarian lines against the interests of those it is meant to serve. The present scheme, however, embodies many checks to such a tendency, and we see no reason whatever to think that it will diminish the scope for individual kindliness. There are other links between practitioner and patient besides the payment of a fee for each service rendered. —ED. L.

TRILITE INHALER IN OBSTETRIC CASES

SIR,—During the past few months we have used the 'Trilite inhaler' described by Dr. Hayward-Butt (Dec. 13, p. 865) in various hospitals and nursing-homes for the administration of 'Trilene' and air analgesia to obstetric cases. Our results are as follows:

Analgesia completely satisfactory	..	63 (75%)
Only partial relief	..	14 (16·7%)
Failure	..	7 (8·3%)
Total	..	84

Of the 84 patients, 54 were primiparæ. There were 79 normal deliveries under trilite analgesia.

There were 6 perineal tears, 5 being first degree and 1 second degree, all successfully repaired under trilite analgesia. One baby was stillborn, the fœtal heart sounds having been inaudible before labour began.

All the primiparæ were given pethidine in the first stage. Eight patients (2 multiparæ and 6 primiparæ) had been given gas and air without adequate relief before using the trilite inhaler; they all obtained greater benefit from the inhaler. The longest time for which the inhaler was used in any case was eight hours; this patient was able to take her meals during labour without any nausea. In no case was any ill effect on the child observed.

The cases in which analgesia was not an unqualified success or was absent can be accounted for as follows:

1. Highly apprehensive or excitable patients, who did not coöperate well.
2. Patients suffering from some form of nasal obstruction who preferred mouth-breathing.
3. Those who objected to the smell of trilene.

It was noted that almost all the patients who could not manage the trilite inhaler for themselves obtained adequate relief when given a trilene apparatus with a facepiece—namely, a Hyatt or Freedman bottle.

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Some excitable and uncoöperative patients find it almost impossible to hold the inhaler in one nostril while occluding the other; this is particularly noticeable if at any time in the second stage the patient is turned on to her back. Several patients, though very satisfied with the relief they obtained, suggested that the psychological factor of having "something to bury their face in during a pain" was most important, and that they would therefore prefer some kind of facepiece. Some patients, on the other hand, preferred not having a facepiece, but complained that their nostrils became painful after using the inhaler for some time. The cleansing and sterilisation of the nozzle after use presented some difficulty in its present undetachable form.

These objections could largely be overcome by fitting a small rubber facepiece with expiratory valves to cover the mouth and nose; this could screw on and be interchangeable with the present metal nozzle for use in obstetric practice. A rubber covering to the nozzle type of nosepiece should also be made available if desired. We are convinced that such modifications would ensure a much higher proportion of successes in midwifery cases.

EILEEN GUNDERSON
Anæsthetist, South London Hospital for Women; Anæsthetic Registrar, Queen Charlotte's Hospital.
FRANK MUSGROVE
London. Obstetric Registrar, Royal Northern Hospital.

FOOD FOR OLYMPIC ATHLETES

SIR,—Athletes of different nations have varying ideas on how best to train for Olympic and other international contests. In the same way, no two régimes suit any one competitor. But a basic intake of energy-producing food to balance the energy expended in training is essential not only to maintain body-weight and effort at an adequate level but to avoid staleness. To arrive at the day at the peak of condition, fit and keen, is the aim of every athlete and his trainer. Unfortunately, it is not always achieved; and under present training conditions in this country it is more than ever difficult to attain.

The actual calorie requirements of the athlete vary within very wide limits depending on the amount of work he puts in. But a minimum of 3750 over 24 hours should be allowed. This is taking 3000 as the basic calorie-intake level for a healthy young man and allowing 750 in addition for training. The actual calorie loss in athletics is not as great as some would perhaps imagine. A marathon race or a five-set tennis match may use an additional 1200 calories. On the other hand a three-mile road-race, 15 rounds of boxing, or the inter-Varsity boat race will not deplete the body of much more than 500.[1] But something between these two will be required for training over a period of many months.

Proper training is obviously out of the question on our present rations, without supplement. It is probable that, as the time for the Olympic Games draws near, we shall have an ever-increasing clamour for more food for our representatives. By then, of course, it will be far too late. Six months is a minimum for both training the muscles to perform and allowing the gastric mucosa to accustom itself to absorb greater quantities of food without rebelling. An example of how fallacious is the idea that quick adaptation can take place was the experience of our cricket team in Australia, where weight was put on but speed of eye and muscle was sadly reduced.

We have been low in protein and lamentably low in fats for a long time. Now even carbohydrates are limited. Proteins are required for muscle repair and at least 80 grammes of available protein is a daily necessity for the athlete. Additional fats are even more essential. They can replace the milk, meat, and cheese of the training diet and by alternation help the athlete to avoid staleness.[2]

Even if her representatives are adequately fed, Britain cannot hope successfully to compete in many branches of sport with other countries which have basically better performers. And, as a nation, we are good losers. But that is not the point. Our men should go to the contest as fit as they can be made. As it is, if we are not very lucky some of our best performers will have the muscle breakdowns which are so disheartening to a team trying to do its best. With a little forethought and no hardship to anyone all this could easily be avoided.

London, W.1. NEVIL LEYTON.

1. Deutsch, F., Kauf, E. Heart and Athletics. St. Louis, 1927; p. 169.
2. McCurdy, J. H., Larson, L. A. Physiology of Exercise. Philadelphia, 1939; p. 292.

THE PLEBISCITE

SIR,—We have been surprised to hear the view expressed at recent meetings that "the whole-time people do not matter." It appears to have been generally assumed that whole-time officers employed in hospitals will automatically accept service under the Act, because they do not find anything in it which conflicts with their principles.

It is important that this misapprehension should be removed. Those of us who have chosen full-time service have done so voluntarily, and up to the present time have been happy to work in our respective fields with a full sense of professional freedom and independence. We have derived that independence from our ability to change our employing authority at will or, in the last resort, to transfer our allegiance solely to our patients and ourselves in the freedom of general practice.

We believe the broad intentions of the Act to be excellent and desirable, but the Minister's statement makes it abundantly clear that there is to be one employer and all are to be employed. To many of us who are at present engaged in whole-time service the Act may offer substantial material advantages, but it is vital that none of us shall ignore the fact that our freedom is essentially dependent upon a large body of general practitioners, who shall not be paid by salary and who shall have the fundamental right of all men to appeal to a court of justice.

D. H. BARNBROOK
K. A. COWAN
J. C. FORD
F. J. FOWLER
J. R. ANTHONY HALL
GRAHAM POOLE
G. E. E. USHER-SOMERS
W. E. WIMBERGER
Hallam Hospital, West Bromwich. Medical Superintendent.

SIR,—At all the meetings I have attended recently in connexion with the plebiscite and in all the correspondence thereon the term "basic salary" is constantly used.

Might your readers be reminded that the Minister never used such a term himself? His words were "fixed annual payment." Lawyers tell me they are different in their interpretation, also that there is a great deal of difference between a contract "of service" and a contract "for service," the former coming under P.A.Y.E. and the latter under schedule D for income-tax.

Worthing. HAROLD LEESON.

SIR,—Another example of Satan rebuking sin—this time Mr. Aneurin Bevan warning the doctors against their judgment being "distorted by slogans." This comes ill from one who airily dismissed the reasoned misgivings of the Negotiating Committee with the slogan: "hard cases make bad law." The tragic humour of the situation is the fact that, in this instance, the very reverse is true—a bad law makes hard cases.

Epsom. A. H. GALLEY.

SIR,—I am one of the considerable body of ex-Servicemen working as a trainee specialist to whom Dr. Jewesbury refers in his letter of Jan. 10.

My vote will be influenced not only because I consider the policy of a whole-time salaried service bad for medicine in general but more particularly because I have no right of appeal to an independent court against an unfair ministerial decision; and any contract I sign may be subsequently altered by the Minister in a unilateral way after an initial period of two years. The implications of this for the young specialist are not fully realised.

The use of a veiled threat, that I may jeopardise my future income by voting according to my principles, is in my opinion wholly immoral and makes me even more suspicious of the scheme.

St. Bartholomew's Hospital, London, E.C.1. W. COOPER.

SIR,—A minority of doctors within the British Medical Association views with misgiving the success of the council's campaign to defeat the intention of Parliament

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by a refusal of service. It is felt that the present plebiscite is designed to strengthen resistance to the Minister rather than to ascertain the possibility of a working agreement being reached by July.

To reflect the truth, a plebiscite is best prepared by independent statistical experts, as was that of 1944. This questionnaire showed more than one-third in favour of basic salary, plus capitation fee, and more than half expressed their opinion that the measure of direction proposed was reasonable and that the sale of practices should be abandoned. It is deplorable that political feeling should have so largely undermined the coöperation that might have been forthcoming from those who hold that the success of this service is of greater moment than immediate political victory.

Unity of the profession will be impossible while the council uses its great powers to withhold from the nation a social amenity that, broadly speaking, has the approval of all political parties and of the great mass of the people.

The public and the minority within the profession have a right to know the minimum amendment of the Act that would enable the majority to accept service. A great effort on both sides should be made during the coming months to bridge this gap and to avert a conflict between a liberal profession and the people it has always served so well.

Barnstaple. R. M. J. HARPER.

Obituary

ARTHUR CHARLES DOUGLAS FIRTH

M.A., M.D. CAMB., F.R.C.P.

Dr. Douglas Firth, consulting physician to King's College Hospital, was educated at Harrow and at Trinity College, Cambridge, where he graduated B.A. in 1901. He continued his medical training at St. Thomas's Hospital, taking his B.CHIR. in 1909, his M.B. two years later, and his M.D. in 1914. During the 1914–18 war, though dogged by ill health, he served in the R.A.M.C., with the rank of captain.

Shortly before the war Firth had been appointed to the staff of the London Chest Hospital, and on his return to civilian life he began his medical career in earnest, soon joining the honorary staffs of the Royal Free Hospital and the Royal National Orthopædic Hospital. Always interested in children, in health or sickness, he also served for many years the Victoria Hospital at Chelsea. He resigned from the Royal Free on his appointment to King's College Hospital in 1919, and in the following year he was elected F.R.C.P.

At King's his enthusiastic and unselfish work quickly won him a place in his adopted school. Keenly interested in the students, their work and games—he seldom missed a rugby match—he also gave much time and care to the health of the nursing staff, and he took great interest in their tuition. His shrewd judgment made him much in demand as an examiner; many a nervous candidate may unknowingly be a debtor to a quick appreciation of difficulties and a sympathetic understanding which helped him to pass the ordeal. Firth also showed these qualities as censor (1940–42) and senior censor (1945) at the Royal College of Physicians. A swift grasp of the essential point and a correct appreciation of values made his opinion sound in assessing candidates for life assurance, and he acted as principal medical officer to several companies. He did not write much on modern medicine but was greatly interested in general and medical history. One of his most delightful essays was on the first case of disseminated sclerosis described in English by the patient himself—The Case of Augustus d'Este—published in the *Proceedings of the Royal Society of Medicine* in 1941.

Of his service to the hospital C. F. T. E. writes: "Kindliness and loyalty to his colleagues were the hallmarks of Firth's character. He was never heard to say an uncharitable word of anyone; criticism was always tempered with a humorous touch or quaint turn of fancy that dispelled any hint of severity. Full of those little unnamed unremembered acts of kindness, he was always ready to do a good turn or lend a helping hand. Keenness and conscientious thoroughness were the mainsprings of his work, and as a clinician his instinct was sure and quick, while his sympathetic insight won him the devotion of many a 'poor old dear' at outpatients or in his wards. Widely read, and well versed in literature and history, a lover of nature, the mountains, and wild things, he could always enliven his teaching and illuminate his conversation with the charming allusions of one who was a countryman at heart."

C. N., a former student, adds: "Though he was not a great scientist, Dr. Firth was a good doctor and a good teacher. He loved the practice of medicine, and found a lasting delight in the application of his own power to diagnosis and to the treatment of the individual patient. And he enjoyed teaching the ordinary student, grounding him in that same technique of history-taking and physical examination which he applied so well himself. He was at his best on the ordinary case, which is so important in the examinations and in the daily routine of medical practice, the kind of case which the conscious intellectual so soon seems to find dull. He taught simple medicine with interest and care, providing exactly what the undergraduate student most needs, showing how interesting and important the simple things are, and so laying the foundation on which advanced scientific teachers could build. He also kept in the forefront the patient as a person, rather than as the physical vehicle of disease. The laboratory and the post-mortem room were of less interest to him than the bed, and the bed was not more interesting than the outpatient department. He had a great modesty: he never suggested that the more modern attitude to medicine was less important than the more conservative, and he never preached, or propounded explicitly his own approach: he just taught it in a straightforward manner. What Dr. Firth taught was important, and he knew that it was. He was a doctor, not a medical practitioner."

When he left King's in 1945 he returned to Cambridge. "His old friends there were delighted," H. R. D. says, "if perhaps they shared the surprise of his London colleagues, when they heard that the senior censor of the Royal College of Physicians had accepted the post of secretary of the Committee for Postgraduate Instruction for Demobilised Medical Officers. But doubt, if anybody felt doubt, of the wisdom of his decision was rapidly dispelled by the vigour and enthusiasm, almost youthful, which Firth threw into his new job. His experience as a teacher and his sympathy with youth made it easy for him to understand the difficulties and problems of young men whose clinical training had been interrupted by service with the Armed Forces. His wisdom and great experience as a physician were at the service of all who sought his advice." Shortly after his return to Cambridge Firth was elected at Trinity Hall into a fellowship in which he found great happiness in the society of his friends, both old and new. In all college business he took an active share, and he showed a special interest in college documents and records, the study of which was the favourite occupation of such hours as he could spare from his university duties.

Firth had a very happy family life and spent most of his holidays walking with his own four children in the Lake District. An expert philatelist, his special interest was the collection of ship's letters, that is to say, letters sent home in the early days of our Colonial history through the captains of small brigs and sailing ships, to be posted and post-marked at small and now forgotten ports. He always appeared young and brisk, so that the passing years seemed to touch him but little. He never complained, in spite of health which was often far from good, and a serious illness eighteen months ago was not allowed to interfere with his work. He died on Jan. 9 at the age of 67.

Dr. Firth married in 1914 Miss Violet Reeves, who survives him with one son and three daughters.

THOMAS EDWARDS READE

M.B. BELF.

Dr. T. E. Reade, of Banbridge, co. Down, who died on Jan. 5 at the age of 40, was the elder son of the late Adam Reade, principal of Portstewart P.E. School. He was educated at Coleraine Academical Institute and took his medical course at Queen's University, Belfast,

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where he graduated in 1931. After qualifying he held resident posts at the Royal Victoria and other Belfast hospitals. About eleven years ago he settled in Banbridge and took over the posts of surgeon to the Royal Ulster Constabulary and the Post Office, and he was also certifying factory surgeon for the district. During the war he served as an officer in the Home Guard and for a time was civilian medical officer to the troops stationed at Gilford. He acted as secretary and treasurer of the Banbridge and district medical club. A keen and proficient golfer with a handicap of two, he was a member of Royal Portrush, Portstewart, and Banbridge golf clubs.

Dr. Reade is survived by his wife, a daughter of Dr. William Boyd.

Public Health

Health Centres

IN a message to local authorities (circular 3/48) the Minister of Health expresses his belief that properly designed and conducted health centres will prove "a key feature in the general reconstruction of the country's health services." It is, however, clear, says the circular, that any general programme for their provision will be out of the question for some time. The alternative—conversion of existing buildings—is largely impracticable through lack of suitable accommodation; moreover this would involve "a real risk that second-rate production may prejudice the attractiveness of the whole Health Centre conception," and it is imperative that centres should not be badly started. The date by which local health authorities must submit proposals for health centres is indefinitely postponed; but where, after consultation with the executive council and other interests concerned, the local health authority concludes that centres are urgently needed, proposals will be considered.

The task of advising on the form and functions of health centres is to be allotted to a special committee which the Minister proposes to set up as soon as the Central Health Services Council is in being.

Allowances for the Tuberculous

In November, 1946, a deputation from the Joint Tuberculosis Council and other organisations concerned with tuberculosis was assured that the Ministry of Health "fully accepts the view that tuberculosis calls for special provision in the interests both of the patient and of public health"; and also that "the Assistance Board will, it is hoped, be empowered in the new Bill to make payments to *needful* persons under treatment for pulmonary tuberculosis on a scale higher than the normal scale of assistance applicable to the community as a whole." A memorandum signed by Dr. C. K. Cullen, convener of the council's committee on memo. 266/T, doubts whether these views have in fact been fully implemented by the Bill.

Section 5 (3) of the National Assistance Bill provides that "regulations under this section . . . shall make special provision for . . . persons who have *suffered a loss of income* in order to undergo treatment for pulmonary tuberculosis." At present many patients not covered by memo. 266/T are receiving public assistance under the poor-law: this assistance is given on a basis of need without reference to "loss of income," and many of them have in fact been unemployed for some time before the discovery of tuberculous disease. The new Bill apparently excludes these patients from the higher rate of assistance.

Most tuberculosis administrators welcome the Ministry's intention that the higher rate of assistance should be conditional upon the patient undergoing treatment. But Dr. Cullen points out that it means that the patient must submit to arbitrary decisions as to treatment ordered by one doctor, and he suggests that it might be wise to include some right of appeal. He also disputes the Ministry's wish to restrict the special scale of allowances to cases of pulmonary tuberculosis. When memo. 266/T was introduced there was an outcry against the exclusion from benefit of chronics and of non-pulmonary cases. The restriction on chronics has now been removed. As the number of adult non-pulmonary cases is small, the cost of their inclusion would not be heavy, and it would, Dr. Cullen considers, be outweighed by the benefit of the extra safeguard to the health of the susceptible family.

Poliomyelitis and Polioencephalitis

In the week ended Jan. 10 notifications of poliomyelitis numbered 52 (59) and of polioencephalitis 6 (4). Figures for the previous week are shown in parentheses.

Deaths in the U.S.A.

Figures issued by the National Office of Vital Statistics show that 1946 marked a new record low level for the crude death-rate in the United States. The death-rate for the year was 10·0 per 1000 population, compared with 10·6 in 1945 and the previous lowest rate of 10·4 in 1942.

During 1946 deaths from diseases of the heart increased for the third consecutive year, accounting for 30·8% of all deaths, compared with 30·3% in 1945 and 29·6% in 1944. The importance of malignant disease as a cause of death continues to grow: in 1946 it accounted for 13·0% of deaths. In 1946, as in 1945, record low figures were reached for deaths from pneumonia and influenza, and from tuberculosis; deaths from pneumonia and influenza were 8·9% fewer, and from tuberculosis 3·8% fewer, than in 1945. From 1945 to 1946, although the number of births increased approximately 20%, the number of deaths from diseases of pregnancy, childbirth, and the puerperium decreased 9·1%.

The five leading causes of death in 1946 were diseases of the heart, cancer, intracranial lesions of vascular origin, nephritis, and accidents other than motor-vehicle accidents. This is the first year in which pneumonia and influenza (combined) have not figured in the five leading causes.

Diary of the Week

JAN. 25 TO 31

Monday, 26th

ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. H. Jackson Burrows: Static Derangements of the Foot.

ROYAL SOCIETY OF ARTS, John Adam Street, W.C.2
4.30 P.M. Dr. C. H. Andrewes, F.R.S.: Common Cold. (Cantor lecture.)

INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
2 P.M. Mr. W. M. Mollison: Headache.

Tuesday, 27th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Roland Barnes: Brachial Plexus Injuries.

INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. Hugh Gordon: Sclerodermias.

Wednesday, 28th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. R. H. Young: Derangements of Lumbar Spine and Pelvic Joints.

INSTITUTE OF LARYNGOLOGY
4.30 P.M. Mr. V. E. Negus: Larynx.

Thursday, 29th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. St. J. D. Buxton: Fractures and Dislocation of the Shoulder-joint.

INSTITUTE OF DERMATOLOGY
5 P.M. Dr. G. B. Mitchell-Heggs: Dermatoses due to Filtrable Virus.

Friday, 30th

ASSOCIATION OF CLINICAL PATHOLOGISTS
9.30 A.M. (St. Mary's Hospital, W.2.) Scientific meeting.

ASSOCIATION OF INDUSTRIAL MEDICAL OFFICERS
5.15 P.M. (London School of Hygiene, Keppel Street, W.C.1.) Dr. C. M. Fletcher: Coalminers' Pneumoconiosis.

LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. E. H. Hudson: Selection of Cases for Artificial Pneumothorax.

Saturday, 31st

MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES
2.30 P.M. (11, Chandos Street, W.1.) Dr. J. Purdon Martin: Neurosyphilis.

ASSOCIATION OF CLINICAL PATHOLOGISTS
9.30 A.M. Scientific meeting continued.

ASSOCIATION OF INDUSTRIAL MEDICAL OFFICERS
10.30 A.M. Prof. E. J. King, D.SC.: Silicosis.

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Notes and News

THE MINISTER AND THE B.M.A.

SPEAKING at Pontypridd last Saturday, Mr. ANEURIN BEVAN, Minister of Health, said that on the merits of the Health Service Act "the atmosphere is charged with partisan feeling." He would later make a statement in the hope of creating a better sense of proportion in the minds of those who would be responsible for making the Act a success. He urged doctors in the meantime not to be influenced too much by the utterances of "a few persons who claim to be speaking for the whole profession." The statement he had already made, which had been circulated to all doctors, should be read as dispassionately as possible. "Do not allow your minds to be inflamed or your judgment to be distorted by slogans which are addressed to your emotions and not to your intelligence. Keep in mind that the emotions of the moment will pass, but that the obligations to provide an efficient health service for the British people will be permanent."

Mr. Bevan continued: "The Health Act will start on July 5; that is the will of Parliament, and Parliament, after all, is still the supreme authority in Britain. The new health service can be launched smoothly and harmoniously in the best interest of the people whom it will have to serve, or it can be launched stormily, surrounded by prejudice, poisoned by misrepresentations, and fragmented by partisan passions. The responsibility for deciding between these two rests largely with the profession. Parliament has spoken; the country now awaits and expects the coöperation of the medical world."

In reply, Dr. GUY DAIN, chairman of the council of the British Medical Association, issued a statement denying the charge that the medical profession is defying Parliament. In imposing on the Minister the duty of introducing a comprehensive health service, Parliament must have expected that he should conduct himself in such a manner as to secure the coöperation and goodwill of those concerned, who believe in a comprehensive health service as much as he does. Parliament had imposed no obligation whatever on doctors to join the service; Mr. Bevan himself had explicitly admitted that the profession was free to enter or stay out, as it chose; he had also admitted that doctors, like other workers, had the right to make up their minds collectively. Why did the Minister's supporters in the press continually raise untrue and malicious charges of sabotage? "Reasoned criticism —however violent—of B.M.A. policy is one thing, but damaging and malicious imputations of this kind are another matter, and we are watching the situation closely." If it was partisanship for the medical profession to stand for the freedom which was the public's as well as its own, then it was guilty of partisanship: if it was prejudice to stand for a principle—the integrity of medicine—then it was guilty of that too.

THE NATION AND THE FAMILY

IF the foundations of good citizenship are best laid in the family, it follows that broken homes mean poor citizens. Nowadays the numbers of marriages which break down are increasing. Dr. J. D. Kershaw, in a recent book,[1] joins the Denning Committee in approving the work of the Marriage Guidance Council; and Mr. C. E. A. Bedwell, in discussing this book,[2] points to the work done by the Peckham Health Centre in fostering the full development of family life. Apart from the opportunities it gives all members of the family to meet their contemporaries and to enjoy an active social life with them, the centre encourages a natural and unself-conscious attitude to maternity: the pregnant mother takes part in the life of the centre, enjoys herself in the swimming-bath, and shares in social activities without embarrassment. She is encouraged to have her child at home, if possible, rather than in hospital; and Mr. Bedwell considers that this gives the child the best start, for both father and mother combine to produce the right emotional environment, and since the mother is more confident and at ease in her own home than in hospital, she is better able to feed the child.

Among other things, Mr. Bedwell discusses the influence of boarding-school education—now open to larger numbers—on family life and on the development of the child. The Curtis Committee came down heavily on the side of the foster home as against the institution for the child deprived of a normal family life; and it may well be asked, "Why take a child from a normal family and put him in a residential institution for two-thirds or more of the year?" Apart from the answer that there are institutions and institutions, it seems possible, as Mr. Bedwell suggests, that the two experiences are complementary: those who have a natural family life profit by the discipline and group life of the institution, just as purely institutional children would profit by periods in the freer more responsible environment of the family.

1. An Approach to Social Medicine. London, 1946.
2. *Quarterly Review*, January, 1948, p. 56.

FUTURE OF PHARMACISTS' COLLEGE

THE Pharmaceutical Society of Great Britain have decided that owing to the steady rise in costs they cannot continue to maintain their college, founded in 1842. After consultation with the University of London, they propose that the college should become an independent corporate body governed by a council including representatives of the society, the university, the academic staff, and the pharmaceutical profession and industry; the college would remain a school of the university. The society and the university are now discussing a proposal that the latter should take over the building in Brunswick Square intended to house the college, on which the society have already spent £200,000 and which would need twice as much again for its completion.

HUMAN NEEDS

EVERYONE forms his own idea of the conditions for happiness. Dr. R. D. Lawrence, in a very short book,[1] sums them up as an opportunity to gratify four primary instincts —those concerned with self-preservation, reproduction, power, and membership of the herd. Self-preservation, perhaps, goes without saying: for certainly a condition of human happiness is that one should be alive to enjoy it. When James Stephens's philosopher asked Meehawl MacMurrachu how he knew it was no fun being dead, Meehawl replied, "I know well enough"; and his conviction is widely shared. On the subject of power Dr. Lawrence usefully reminds us that power can be enjoyed just as much when exerted on things rather than people: the moral seems to be more hobbies for dictators. He attaches a good deal of importance to gratification of the sex instinct, with its natural outcome, the family. His chapter on the herd instinct inevitably owes much to Wilfred Trotter, and deals with the strong influence which the opinion of the herd exerts on the individual, whether he rebels against it or conforms. Dr. Lawrence sees in this instinct, however, the hope of a better understanding between races in the future. "Even during wars," he points out, "there are moments of realisation that individuals in enemy herds are the same flesh and blood, the same in suffering and pain. This augurs that national isolations and prejudices may not raise everlasting bars of race and colour (I feel them myself) against international sympathy and practical coöperation."

Mental and spiritual aspects of happiness he polishes off in ten pages. "Some fixed religious belief (explanation of life)," he says, "is necessary to most men to provide the comfort of a finality which they crave." This seems rather a circumscribed view of the hunt for truth which has occupied philosophers and mystics, no less than scientists, through the ages; and despite his friendly proposal—"let us agree to differ"—the reader is left with a rebellious feeling that there is more to the higher ranges of human thought than just that.

In a last chapter Dr. Lawrence makes some concrete proposals. Self-preservation must be made possible by planned sharing, and the assurance of bodily security. A sense of power can be experienced in games and sports, in controlling nature and physical objects, and in all creative pursuits. His plans for the family have been more difficult to formulate, for though he believes that "those who intimately care for and bring up children are the richest in humanitarian feeling," he also thinks that family life does not suit many men, and some women and children; which seems to leave us much where we are at present. His plea for "a different sex and family convention" is perhaps too vague to be helpful. The herd instinct, however, he feels, is fully gratified in the institutions of democracy, which allow of personal freedom in a framework of social order and coöperation.

1. Happiness and Our Instincts: a Doctor's View of Human Needs. London: C. & J. Temple. 1947. Pp. 71. 4s. 6d.

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LONDON REGIONAL PSYCHIATRISTS' ASSOCIATION

AN informal committee of psychiatrists in the North-west Metropolitan hospital region met early last year, under the chairmanship of Dr. W. J. T. Kimber, medical director of Hill End Hospital and Clinic, St. Albans, to discuss some of the main psychiatric needs of the region. Five small working-parties prepared reports on: (1) adult outpatient services, (2) child-guidance services, (3) mental hospital accommodation, (4) mental deficiency, and (5) postgraduate training in psychiatry. The reports have been printed and are being circulated to all psychiatrists who expect to be employed in the organised psychiatric services of the region. The informal group has proposed that its activities should now be continued by a more comprehensive association of psychiatrists from the region, and the mental-health subcommittee of the regional hospital board has welcomed this proposal. A meeting is therefore being held on Wednesday, Jan. 28, at 4.30 P.M., at the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, to discuss the formation of such an association and its representative committee. Any psychiatrist in the region who has not yet received a copy of these reports along with the notice of the meeting should communicate with Dr. J. D. Sutherland, 2, Beaumont Street, W.1. Others may obtain the reports at 5*s.* per copy.

QUININE

Mrs. Duran-Reynals's book [1] is not a large one but is packed with interest. The historical element is interwoven with the grim facts of the long quest for a remedy for malaria. Man's failure against that enemy was partly the result of working against his own salvation: so often he builds only to destroy. This book passes in review, from Hippocrates onwards, the leaders of medical thought as actors in a story of human blindness and prejudice—as it seems today. Only in the 17th century did the medical profession begin to evince a tepid interest in this strange and seemingly almost universal plague, and even the great Sydenham appears to have taken evasive action rather than commit himself as to its cause and treatment. At that stage a glimpse of the light was given to the physicians of the time but they turned aside. It was left to the missionary, the botanist, and the explorer to drag from the jungle the secret of the fever bark. Among these the Count of Chinchon, the Cardinal de Lugo, and the tragic Nutis will ever be held in honour, though their original portion was frustration and obloquy. Mrs. Duran-Reynals tells her tale with skill and realism, and does not spare her readers.

MIDWIVES TODAY

WE are as short of midwives as of nurses, but for different reasons. Nurses are lost in large numbers during training, midwives after qualifying; and while we cannot attract enough girls to fill training places for nursing, we have scarcely enough places for those who seek a full midwifery qualification. The report [2] of the Central Midwives Board for 1947 notes that the "first certificate," awarded to State-registered or sick children's nurses on their passing the first examination of the board, is required by those who intend to take a health visitor's training, or an overseas nursing appointment, or who wish to seek promotion in the higher fields of nursing. In 1946–47, 3486 candidates were successful in the first examination, the highest number ever recorded. Of the 2155 candidates for the second examination, during the year, all but 221 were State-registered nurses.

Some 60% of midwife teachers responsible for the theoretical and practical training of pupil-midwives hold the midwife teachers diploma of the board, or its equivalent, and it is hoped that in time all teachers will be qualified in this way. The standard of candidates presenting themselves for the diploma course is not high, on the whole, but the quality of those passing is ensured by a large percentage of rejections. Candidates train on their off-duty days, under great difficulties, travelling to the nearest centre where a non-residential course is held, and often paying their own expenses. The board rightly hope to establish residential courses, enabling prospective midwife teachers to live for a time in an atmosphere of teaching. These training institutions, they consider, should be associated with a university.

About 4600 midwives have a certificate of proficiency in the administration of gas-and-air analgesia issued by a training institution before January, 1946. Since that date the board have issued their own certificate to candidates who pass a test. Up to March 31, 1947, this certificate had been granted to a further 1835 midwives. All the 110 first-period, and 74 of the 94 second-period, training-schools are now approved to give instruction in this form of analgesia, and four types of gas-air apparatus are accepted for the purpose: the Minnitt, the Walton-Minnitt, the Amwell, and the Jecta. The board have also been asked to consider the use of 'Trilene' as an analgesic to be used by midwives, and of the Chassar Moir attachment to the Minnitt apparatus, which permits the patient to take two or three breaths of pure nitrous oxide. They have asked the Royal College of Obstetricians and Gynæcologists to report on both these methods.

1. The Fever Bark Tree: the Pageant of Quinine. By M. L. DURAN-REYNALS. London: W. H. Allen. 1947. Pp. 251. 8*s.* 6*d.*
2. Published for the Board by Spottiswoode, Ballantyne & Co., 1, New Street Square, London, E.C.4. Pp. 23.

BLOOD TESTS OF FRENCH ARMY RECRUITS

FOR the past two years all conscripts to the French Army have been subjected to routine bleeding on joining the Service; the blood is grouped and tested for rhesus factor and syphilitic infection, and the residue converted into dried plasma. At the Laboratoire de Percy, Clamart, near Paris, up to 300 recruits are examined each day. They sit on couches against a wall, with their left arms placed through apertures in the wall. The operating-room, which is virtually sterile, is sunk below the level of the couches so that the subjects' arms are on a level with the operator's eyes. The bottles into which blood is withdrawn are agitated mechanically on a moving stage. The blood is submitted to micro MKR II (tube method), Kahn, and Kolmer Wassermann tests; positive findings are, if necessary, checked by quantitative Kahn and Wassermann tests, and by the Kline diagnostic test. Many of the blood samples are sent from a distance. With 0·5 ml. of blood taken from the finger or ear it is possible to do micro MKR II, Kolmer Wassermann, and Kline tests. Spurious positive results have been recorded with the MKR II, but with no other test, about ten days after vaccination. Grouping sera are dried and put up in ampoules. Although plasma is extensively used for resuscitation, homologous serum hepatitis, as a fatal disease, seems to be unknown.

PHARMACEUTICAL RESEARCH

THE establishment of a Pharmaceutical Research Council to guide pharmaceutical research and to collaborate with the Medical Research Council on the presentation or quality-control of drugs was advocated by Mr. A. G. Fishburn, PH.C., in an address to the Pharmaceutical Society on Jan. 15. In the development of penicillin, he said, it was at first doubtful whether pharmacists were to handle the drug at all, and formulations and assay processes were developed in an extremely erratic manner. Only by the publication of provisional *B.P.* monographs was it possible to introduce some rationalisation; and even now methods of assay, and hence stability data, were lacking for several preparations. The only official guidance in the initiation of research work had been the publication by the British Pharmaceutical Conference of a research list containing some thirty or forty problems deemed worthy of investigation. Even this was discontinued in 1939 and replaced by a system through which research-workers could obtain advice on the choice of subject by application to the conference. This system seemed faulty in that it did not provide the necessary positive stimulus to pharmaceutical research, with the result that many potential research pharmacists migrated into chemistry or biology.

Queen's University, Belfast

On Dec. 19 the following degrees were conferred:

M.D.—G. T. C. Hamilton (with high commendation); R. F. L. Logan, Agnes J. A. Maybin (with commendation); A. S. Boyd, W. G. F. Gibson, D. G. F. Harriman, John Lightbody, Joan B. T. Logan, T. C. T. McFetridge, Kathleen G. McKee, I. B. Millar, T. S. Wilson.

M.B., B.Ch., B.A.O.—Iris Y. B. Hamilton, Helen A. Lynas, John McKelvey (with second-class honours); G. H. I. Anderson, F. S. Black, Wilmert F. I. Brown, Gladys M. Caskey, A. S. Clenaghan, S. J. Cupples, K. E. Donnan, Harriet E. Faris, J. K. Fulton, N. E. Gordon, W. J. Gourley, T. M. Hanna, T. P. Herriott, Godfrey Hinds, T. O'H. Johnston, J. C. Keenan, D. B. Kerr, E. W. Knox, James Kyle, J. N. Lewis, Leo McArdle, J. G. McAuley, S. S. McCann, R. R. McCrea, E. P. McGrath, J. A. McNeilly, M. J. G. MacSorley, Stanley Mercer, R. J. Millar, T. J. M. Montcith, Andrew Mulholland, J. F. Mullan, Mary C. T. Mullan, T. J. M. Myles, E. J. E. Parker, B. J. Reubin, Frances L. J. Robinson, H. G. I. Shanks, H. W. H. Shepperd, H. H. Sloan, Robert Stinson, E. J. Thompson, I. D. Thompson, Irene M. Thompson, J. J. Tomb, G. H. Williamson.

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Royal College of Physicians of London

On Tuesday and Thursday, March 9 and 11, at 5 P.M., Dr. J. F. Wilkinson will deliver the Oliver-Sharpey lectures at the college, Pall Mall East, S.W.1. The title of his lectures is Concerning Megalocytic Anæmias.

Royal College of Obstetricians and Gynæcologists

A prize of £50, offered by a fellow of the college, will be awarded for an essay embodying original work on the Physiology or Management of the Third Stage of Labour. Entries will be accepted from doctors in the British Commonwealth, and must be submitted before Dec. 31 to the secretary of the College, 58, Queen Anne Street, London, W.1, from whom further particulars may be had.

Liverpool Regional Hospital Board

Dr. Alexander Menzies, deputy M.O.H. for Middlesbrough, has been appointed assistant senior medical officer to the board.

Radioactive Isotopes in Norway

A new research station, reports B.U.P., is to be built near Oslo to produce radioactive isotopes for medical and biological research.

Fewer Certificates

Medical certificates issued to expectant mothers for supplementary ration books will be valid in future for four months instead of three, and those issued to tuberculous patients for 26 weeks instead of 13.

Conference of Psychosurgery

An International Conference of Psychosurgery will be held in Lisbon on Aug. 5, 6, and 7. Inquiries from those who wish to read papers or attend should be sent to Dr. E. Cunningham Dax, Netherne Hospital, Coulsdon, Surrey, immediately.

Service Hygiene Officers' Reunion

Brigadier A. E. Richmond will deliver his presidential address to this group of the Society of Medical Officers of Health at B.M.A. House, on Jan. 30, at 5 P.M. (not 5.30 P.M. as previously announced). He is speaking on the Army's Health in 1947.

Woodside Hospital, London

This hospital, which for the past six years has only received Service patients, is now once more admitting civilian private patients suffering from neurosis. When the bomb-damage repairs are completed in the near future, 80 beds will be available, and there is accommodation for a further 15 patients at the hospital's convalescent home in Buckinghamshire. Applications for admission should be made to Dr. J. A. Hobson, acting physician in charge, Woodside Hospital, Muswell Hill, N.10.

Institute for the Study of Animal Behaviour

At a meeting to be held at 3 P.M. on Friday, Jan. 30, at the Zoological Society of London, Regent's Park, London, M. R. A. Chance and D. C. Yaxley will speak on Post-convulsive Behaviour in Peromyscus, and Prof. George Humphrey, PH.D., on Psychological Factors Relating to Convulsive Behaviour in Rats. Sir Edward Mellanby's film on canine hysteria will also be shown. An invitation is extended to all members of the section of neurology of the Royal Society of Medicine and of the League against Epilepsy.

Royal Sanitary Institute

Lord Inman will preside over the health congress of the institute which is to be held at Harrogate from May 24 to 28. The eight sections will deal with preventive medicine, engineering and architecture, maternal and child health, veterinary hygiene, food and nutrition, housing and town-planning, tropical hygiene, and hygiene in industry. There will also be conferences of medical officers of health, engineers and surveyors, sanitary inspectors and health visitors, and the sectional and conference presidents will include Prof. G. S. Wilson, Prof. P. A. Buxton, F.R.S., Prof. Andrew Topping, Prof. R. E. Lane, Mrs. M. D. Baird, M.B., Dr. F. Hall.

During 1948 the John Edward Worth prize (£40) will be offered for an essay on Practical Improvements of Appliances or Inventions in or about Dwelling-houses, and the John S. Owens prize (£15) for an essay on Atmospheric Pollution. Entries must be submitted by Dec. 31, and further particulars may be had from the secretary of the institute, 90, Buckingham Palace Road, London, S.W.1.

Meeting on Plebiscite

A meeting of consultants and specialists to discuss the National Health Service Act and the Plebiscite will be held at B.M.A. House, Tavistock Square, London, W.C.1, on Tuesday, Jan. 27, at 8.30 P.M. Mr. A. M. A. Moore will be in the chair, and the speakers will include Lord Horder, Dr. Geoffrey Marshall, Mr. A. Dickson Wright, and Mr. N. Ross Smith. Registrars and men holding C1 and C111 appointments are invited to attend.

London School of Hygiene

Dr. B. A. D. Stocker has been appointed demonstrator in the department of bacteriology.

Return to Practice

The Central Medical War Committee announces that Mr. R. Vaughan Payne, M.CHIR., F.R.C.S., has resumed civilian practice at Woodhay House, 17, Osborne Road, Windsor.

Dr. R. R. Macintosh, F.R.C.S.E., D.A., Nuffield professor of anæsthetics in the University of Oxford, is visiting Finland, Sweden, and Denmark, on behalf of the British Council, to lecture on the methods of anæsthesia used in Great Britain.

Appointments

CHANCE, G. Q., M.B. Dubl., D.M.R.E., F.F.R.: radiologist, Derby group of hospitals.
FARQUHAR, H. G., B.M. Oxfd: asst. physician, Royal Liverpool Children's Hospital.
GALLOWAY, D. C., M.B. Birm.: senior obstetrical officer, Luton Maternity Hospital.
GORDON, ISABEL, M.B. Aberd., D.P.H.: maternity and child-welfare officer, Somerset.
WILLIS, R. A., D.SC., M.D. Melb., F.R.C.P.: director, pathology department, Royal Cancer Hospital, London.

Royal Portsmouth Hospital, Portsmouth:

BROMAGE, P. R., M.B. Lond., D.A.: asst. anæsthetist.
MERLIN, P. T., M.B. Birm., D.A.: asst. anæsthetist.
YOUNGHUSBAND, J. D., M.B. Camb., F.R.C.S.: asst. surgeon.

Colonial Service:

FENDALL, N. R. E., B.SC., M.B. Lond.: M.O., Kenya.
GODKIN, S. R. S., B.A. Camb., M.R.C.S.: M.O., Kenya.
HAYES, G. T. M., M.C., M.B. N.U.I.: M.O., Kenya.
MCELROY, R. S., M.B. Dubl., D.P.H., D.T.M.: asst. director of medical services, Kenya.
MCNEILLY, J. C., M.B. Dubl.: M.O., Tanganyika.
O'SULLIVAN, J. J., M.B. N.U.I.: house doctor, General Hospital, Singapore.
SPEIRS, R. C., O.B.E., M.D. Edin., D.T.M.: deputy director of medical services, Uganda.
WESSON, R. A., M.R.C.S.: M.O., Fiji.
WOOLNER, H. W., L.R.C.P.E.: M.O., Nigeria.

Births, Marriages, and Deaths

BIRTHS

BICKFORD.—On Dec. 25, at the Mayo Clinic, U.S.A., to Dr. Joyce Bickford (née Davies), wife of Dr. R. G. Bickford—a son.
BROWN.—On Jan. 7, at Birmingham, the wife of Dr. R. J. K. Brown—a daughter.
BYRNE.—On Jan. 8, at Pewsey, Wilts, the wife of Dr. J. Connel Byrne—a son.
CARLSON.—On Jan. 11, at Eastbourne, the wife of Dr. Norman Carlson—a daughter.
DAYNES.—On Jan. 11, in London, the wife of Dr. Guy Daynes—a son.
ETHERIDGE.—On Jan. 12, in London, the wife of Dr. F. G. Etheridge—a son.
GREENSTREET.—On Jan. 12, at Salisbury, the wife of Dr. Peter Greenstreet—a son.
HARE.—On Dec. 19, in London, the wife of Dr. Edward Hare—a daughter.
MCFARLANE.—On Jan. 3, the wife of Dr. M. McFarlane—a son.
MOUNT.—On Jan. 11, in London, the wife of Dr. Laurence Mount—a daughter.
STEPHENS.—On Jan. 12, at Lusaka, Northern Rhodesia, the wife of Dr. P. R. Stephens—a son.
WINCKWORTH.—On Jan. 11, at Taunton, the wife of Mr. Richard Winckworth, F.R.C.S.—a son.

MARRIAGE

BELOE—LATTA.—On Jan. 5, at Glasgow, John C. P. Beloe to Sheila Latta, M.B. Glasg.

DEATHS

ANDERSON.—On Jan. 10, at Dublin, Joseph Barcroft Anderson, M.D. Dubl., D.P.H., barrister-at-law.
GREATHEAD.—On Jan. 13, at Durban, South Africa, Edward Rivers Greathead, B.A. Camb., M.R.C.S.
OLDMEADOW.—On Jan. 14, at Bramley, Hants, Dr. Lloyd John Hollis Oldmeadow, M.D. Edin., F.R.C.S.E.
PLUMBLY.—On Jan. 12, George Lewis Spurrell Plumbly, M.B. Lond., aged 44.
WATSON.—On Jan. 12, at Gibraltar, William Bertram Watson, M.D. Lond., aged 70.

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WHAT IS GOUT?

FREDERIC WOOD JONES
M.B., D.Sc. Lond., F.R.C.S., F.R.S.
SIR WILLIAM COLLINS PROFESSOR OF HUMAN AND COMPARATIVE ANATOMY AND CONSERVATOR OF THE MUSEUM, ROYAL COLLEGE OF SURGEONS OF ENGLAND

Thomas Sydenham wrote his Tractatus de Podagra et de Hydrope in May, 1683. He was then 58 years of age, and he tells us that he had suffered from gout for 34 years. He died at the age of 65. These historical facts provide the only possible excuse for the writing of the present article. I have already exceeded the period of subjective study of gout that was at Sydenham's command when he wrote his treatise, and I have passed the total span of years that was allotted to him.

I experienced my first attack of acute podagra at 2 o'clock in the morning, three days before Derby Day in 1913. Early in the morning of the previous day I had undergone an emergency operation for acute appendicitis, and the circumstances of this first attack have always prejudiced me somewhat against the complaint, for it has consistently attacked me when I am down. Far from being, in my case, the climax to a period of specially good living, it has always struck when I was already depressed physically or mentally as the result of overwork or worry. I trust that this is the only feature in which my personal acquaintance with the complaint may have warped my judgment of it.

To inquire into the cause of gout is obviously outside my professional sphere, but it is impossible to avoid altogether some allusion to what appears to be one of the oldest and most widely held beliefs in medical science—that gout is due to luxurious living and to over-indulgence in food or alcoholic drinks.

Some interest attaches to the dicta of certain of those who have strongly supported this belief. The reporter of John Hunter's lectures on surgery, delivered in 1785 though the report of them appeared much later (Hunter 1835), ascribes to him the very forthright statement that "most people who have had the gout severely have deserved it," and Hunter denied that gout was inherited, since it was not a tendency to gout but a proclivity to luxurious living that was handed on from father to son. The statement is high testimony to Hunter's proverbial honesty, for he was himself a sufferer from severe gout in the foot, and the force of his dictum is somewhat mitigated by the fact that, in a later work (Hunter 1794), he admits that anxiety and what we should now term the stress of modern life were predisposing causes.

Erasmus Darwin (1794) states that "it is a common opinion that gout is as frequently owing to gluttony in eating as to intemperance in drinking fermented or spirituous liquors. To this I answer that I have seen no person afflicted with the gout who has not drank freely of fermented liquor, as wine and water, or small beer." Erasmus was notorious as a great eater; and, though for the most part he limited himself to cowslip wine, there is at least one good story recorded of his happy over-indulgence in that strange form of alcoholic drink. His condemnation of small beer is in strong contrast to the high praise given to it as a beneficial beverage by the gouty Sydenham a century earlier. Of the onset of an attack of gout Sydenham declared that "its only forerunner is indigestion and crudity of the stomach"; and so it may be that any dietetic indiscretion that is capable of upsetting the gouty person sufficiently may be the prelude to an attack.

In my own case not only has gout never been the sequel of high living, but no especial kind or quantity of food or drink has ever been correlated with an attack in over 30 years' experience; and in this regard I have made some experiment. It may be that there is a truly scientific basis for the classification of foods and drinks as gouty or non-gouty, but I am unable to add any support to the thesis. Doubtless there are many upsets of well-being capable of paving the way for the onset of an attack, and I have much sympathy with John Hunter when he claimed "living above par" as a predisposing cause, for by this phrase he did not mean high living but the spending of nervous energy in excess of income.

Little would be gained by making reference to the varied opinions that have been held concerning the nature and causation of gout, and it is perhaps best to be contented by saying that at the present day it is most orthodoxly regarded as "a general and constitutional disease" which consists in "a disturbance of purine metabolism marked by excess of uric acid in the blood."

It must be admitted that, after reading Sydenham's classic description of podagra with his vivid and realistic account of it as a clinical entity, there is somewhat of an anticlimax apparent in the writings of the modern physicians. The "Disease of Great Men," which, as Sydenham declared, "unlike any other disease, kills more rich men than poor, more wise than simple," and in the manifestation of which in his own person he seems to have taken some little pride, has of later years fallen somewhat from its high estate. Two phases may be detected in this progress of its loss of identity. The first was ushered in by a preoccupation in its symptoms as a disease of joints. Once it had passed to the stage of having the adjectives "rheumatoid" or "rheumatic" applied to it (Adams 1857) its downfall had definitely started. It had joined the ranks of an ill-assorted assemblage of pathological processes capable of producing diseased conditions in and around articulations. By 1881, when Jonathan Hutchinson delivered his lectures on the Pedigree of Disease, gout, though recognised as being an agent in causing what he terms "last-joint-arthritis," had almost ceased to be a real entity and had become reduced to mere adjectival level. Various diseases of the eye, rheumatism, spondylitis deformans, gonorrhœal rheumatism, hæmophilia, and many widely different pathological conditions were grouped together as "gouty" and were regarded as being the outcome of some nebulous but protean condition known as "goutiness." Goutiness became a diathesis of which one manifestation was gouty arthritis, to which the pain of Sydenham's "regular gout" was due.

So far as podagra, as a special manifestation of goutiness, is concerned, modern surgeons who have paid particular attention to the foot appear to be in agreement that the signs and symptoms of the condition are due to an actual arthritis (Hauser 1939, Lake 1943). Hauser describes the "extremely painful, swollen, red articulation," and the ultimate appearances of the joint described by all radiologists are universally recognised.

PERSONAL EXPERIENCES

With so much by way of introduction I may be permitted, like Sydenham nearly three centuries ago, to record in very brief form my own personal experiences of the disease. I had my first typical acute attack of podagra in June, 1913, and have suffered from recurrent but irregular attacks ever since. My latest experience has been by far the most instructive. On June 15, 1947, I had a comparatively mild attack of typical podagra in my left big toe; and, though the paroxysmal stage was by no means severe or prolonged, the return to normal was unusually delayed. The successive stages I have been accustomed to recognise are paroxysmal pain, milder pain that has ceased to be paroxysmal, itchiness, and finally "wooden-toe." In this attack the wooden-toe stage had not completely disappeared when on Aug. 30 I had an acute attack of pain in the left groin. The pain was deep-seated, burning, and radiating. It was accompanied by feelings of movement, flutterings, twitchings, and contractions in the affected part. Little

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by little it appeared to focus itself in the region of the hip-joint, with the main direction of its radiations and contraction-pains downwards, not along the course of the sciatic nerve but down the general course of Hunter's canal. In a fortnight the area of maximal pain was in the lower part of the thigh and popliteal space, and finally it settled mainly in the knee. It was only then that I realised that the complaint was typical gout in an area that was new in my personal experience of it. Since about Sept. 14 it has remained in the knee, with some deep radiations down the leg.

Prolonged observation of the affected part is a simple matter. Indeed it is almost compulsory, since coverings are often intolerable and lying down in bed is impossible. My attention was called early to the ever-varying vascular picture presented by the veins of my leg. During a spasm of pain the only indication of the superficial veins was a series of linear depressions over the course of the empty vessels. This complete emptiness was followed by subsequent filling, until a state of engorgement was reached, only, after various intervals of time and various phases of pain, to be followed by a further period of emptying. At the same time an area around the ankle-joint went through alternate stages of showing a very conspicuous complicated pattern of congested superficial venules, followed by complete obliteration of any visible signs of the stellate meshwork.

VASOMOTOR UPSET

Repeated observations appeared to correlate so definitely the pain with the varying vascular picture that it was impossible to avoid recalling some previous experiences that seemed to point to the fact that gout might be a manifestation of some upset in the autonomic system responsible for vasomotor control. Even if the cause of gout must be regarded, notwithstanding the advances of modern medicine, as being rather indefinite, I fancy that some consideration of certain familiar anatomical details may make its seat rather more readily explicable.

Arteriovenous Anastomoses

The anastomoses between arterial branches in most parts of the body are readily explicable as being (1) the result of developmental changes of arterial pattern or (2) simple mechanical adjustments to the type of ultimate distribution. But there is one familiar form of arterial anastomosis that does not fit in with any such simple explanation. The surgeon is apt to assume that the abundant arterial anastomosis in the neighbourhood of joints is a special provision permitting of the possibility of ligation of the main artery of the limb. In a vague way the anatomist has accepted it as an expression of an abundant blood-supply to articulations. Despite its very special teleological implications the surgeon's explanation is probably nearer to the truth, for the tissues that enter into the composition of the articulation are notoriously independent of a copious supply of blood.

The arterial anastomoses around joints are minutely described in all textbooks of anatomy, since, apart from their former surgical importance, they exemplify the general principle that in the limbs "anastomoses are more frequent between the arteries in proportion to the remoteness of these vessels from the heart" (Hart 1835). The arterial tree of the limb arteries makes this general truth abundantly clear, for the ultimate breaking up of the multiple digital arteries and the vast complexity of their anastomoses taxed even the most skilled exponents of fine injection in the preparation of satisfactory specimens. The arterial anastomoses of the tarsus and carpus, of the ankle and wrist, of the knee and elbow, and of the hip and shoulder are well known in consequence of their surgical importance.

But the disposition of the veins in these situations is by no means so precisely described in textbooks of anatomy. Nevertheless the venous periarticular plexuses of anastomotic vessels are just as abundant and as complex as those of the arteries.

Thirty years ago I drew attention (Jones 1917) to the fact (probably already well known some centuries before) that, so far as the relations of the deep and superficial veins of the limb were concerned, each segment of the limb was a self-contained venous unit capable of its own adjustments for securing venous circulation. It is therefore a very natural step to inquire if it is possible that each segment of a limb may not only be a self-contained functional venous unit but also might possibly constitute a complete circulatory unit capable of self-adjustment to all circulatory demands. To fulfil this condition there should be some arteriovenous connexion between the periarticular arterial and venous plexuses more plastic and more capable of adjustment than the normal capillary bed.

So far as the ultimate plexiform vessels in the digits are concerned, this condition is amply met by the arteriovenous channels described in connexion with the glomus bodies. There is no need to detail the vast and growing modern literature concerning arteriovenous anastomoses in distal parts; nor is there need to regard their existence as being merely hypothetical in the periarticular plexuses, for according to Jacques (1903) Sucquet described them in that situation so long ago as 1861. It is therefore not illogical to assume that each segment of a limb is a complete self-regulating circulatory unit with its own arteriovenous shunt under the control of autonomic vasomotor nerves. Perhaps the progress of dry gangrene up a limb after arterial ligation affords one of the most dramatic demonstrations of this truth, and even the stages of recovery of an ordinary "dead finger" are instructive in this connexion.

So far as the joints are concerned, they may be regarded merely as nodes separating, yet connecting, the series of individual circulatory units of the limb. Of all the arterial and venous plexus arcades in the limbs with their complex arteriovenous connexions the distal one is the most important and the most constantly functional. The digital arcades with their glomus-body connecting channels are apparently part of the nervously controlled mechanism for heat regulation and as such are the most specialised and the most active of all the plexiform vascular junctions in the limbs. They also appear to be the most vulnerable and the most liable to manifest signs of disturbance in the vasomotor autonomic system. Nevertheless it must not be overlooked that the same general arrangement is present at all the joints in, perhaps, a stage of importance and perfection decreasing as progress is made towards the trunk. It is probably unnecessary to add that vascular changes—even very striking ones—manifested in the region of a joint do not necessarily imply that the articulation is involved.

Vascular Changes

In my own personal experience of gout I have been strongly impressed by the vascular changes that take place in the limb; and the typical fluctuating appearances of the joint areas and of the intervening segments of the limbs have persuaded me to believe that the active process involved is a spasmodic and irregular action of the vasomotor nerves controlling the arteriovenous shunts of the periarticular plexuses. Should this in fact be the case, it is not illogical to suggest that gout is only one member of a rather large group of such vasomotor disorders which, though having a common basis, present somewhat different clinical pictures. Perhaps some such graded series as Weir Mitchell's erythromelalgia, causalgia, trench or immersion foot, shelter foot, dead fingers, and Raynaud's disease, with probably many less known conditions, might prove to be varying expressions of the degree and site of the vasomotor disturbance in the periarticular plexus areas.

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It is impossible to read the original accounts of these maladies without being impressed by the many striking and unusual features they have in common. There is no need to recall the strange similarity between the sufferers' own descriptions of their subjective sensations in certain of these conditions, nor is there need to stress the highly affective character of the pain they suffer. Moreover the actual vascular picture in any one type of this group of syndromes is not constant. Though typically the characteristic of the particular condition may be redness of the affected joint or segment, it may change at times to cyanosis or to pallor; in this connexion Weir Mitchell's (1878) observations on the effect of elevation and lowering the limb of a patient with erythromelalgia are particularly suggestive. He speaks of the affected part being "marked by a dull, dusky, mottled redness, as if the smaller vessels were always over-distended." But he continues: "The flushing which at first seems the active condition in a few minutes becomes passive" and "the limbs are cold and even pale."

Sensory Disturbances

Just as the vasomotor disturbances seem obviously to be the result of spasmodic disorder of the autonomic system, so the sensory disturbances seem to be clearly autonomic. The pain is not restricted to any area of definite spinal nerve-supply; nor is it carried centrally along the course of any spinal nerve. The cutaneous sensibility over the painful area is lowered to a point approaching to numbness, and during the 1914–18 war the sciatic nerve was actually divided high in the buttock without producing the least amelioration of the condition in a case of causalgia in the foot. Were the term not somewhat suspect today, it might be said that the pain was protopathic and that its affective qualities were due to this fact. Erythromelalgia, causalgia, and the other conditions enumerated were recognised by their original describers as being diseases of the vasomotor system, for the independent discoveries of the vasomotor nerves by Claude Bernard, Brown-Séquard, and August Waller (1851–53) had attracted wide attention in medical literature. It therefore seems unlikely that gout has not at some time been regarded as a member of the family of vasomotor disorders.

Earlier Observations

A preliminary and quite insufficient review of the literature for accounts of the vascular phenomena characteristic of podagra or regular gout has already yielded some interesting sidelights on the subject. Sydenham appears to have made only one reference to the vascular conditions; but that is a remarkably shrewd one. He says of the sufferer that "he falls asleep, and upon waking finds the pain much abated, and the part affected to be then swelled, whereas, before, only a remarkable swelling of the veins thereof appeared, as is usual in all gouty fits." It is not remarkable that he went no further with his observations on this phenomenon, for it is notorious that he displayed no interest in the circulation of the blood and that, as his learned biographer Joseph Payne (1900) has noted, he never even mentions Harvey or his work anywhere in his writings. Sydenham's attitude is the more easy to understand when we realise that, more than twenty years after Malpighi had demonstrated the capillaries, he could write that "no microscope will ever show us the minute passages by which the blood passes from the arteries to the veins."

Dr. George Wallis (1788), the editor and annotator of Sydenham's Works, added an interesting introductory footnote in which he calls attention to the opinions of Dr. Caverhill. The work to which he refers is obviously John Caverhill's "Treatise on the Cause and Cure of Gout," published in 1769. This is in many ways a very remarkable work. Caverhill alludes to "the apparent difference in the state of the vessels distributed to the joints, and those which are directed to the intermediate fleshy parts." In particular he notes the very ample arterial supply to the foot and especially the big toe. "The first attacks in the great toe," he says, "are seated in the cutaneous arteries," and this fact explains the appearance of the part and the site of the pain. Of the paroxysm itself he says "the fit begins with the pain, which is the natural consequence of an effort to open the arteries." He reproduces Haller's two beautiful plates of the arteries of the sole of the foot and indicates the points at which such "efforts to open the arteries" occur. In the legends to these figures he explains that "the extremities of the arteries end in veins, in the same manner as the extremities of the fingers of the left and right hands appear when placed upon each other." But the strange fact is that he seems to have had no more real appreciation of the capillary system than had Sydenham a century before him. In a monograph of 187 pages he only uses the term capillary twice, and then he applies it in adjectival form to a small artery: of veins he makes no mention whatever in the text of his thesis. Though he had so clear a picture of the pain being caused by some impediment in the flow of the small arteries of plexus areas he did not invoke any cause compatible with the knowledge of the circulation existing at the time (1769) to explain the impediment. Failing any physiological explanation, he fell back on postulating "cohesion," by which he meant an occlusion of the artery by reason of its walls becoming stuck together. It is the breaking down of these cohesions and the stretching of the artery "above the cohering point" preceding the break that causes the paroxysmal pain. Caverhill, like Sydenham, did not take advantage of the physiological knowledge current in his day (for the work of Hales had been published more than 30 years before); otherwise he would have been under no necessity to postulate his cohesions. Notwithstanding his shortcomings as a physiologist, the credit (if credit it be) of being the first to suggest that the physical condition of the joint attacked by gout and the pain resulting from it are vascular in origin seems rightly to belong to him. It would be a remarkable happening if, when a century later the nervous control of the passages connecting arterial and venous systems became familiar knowledge, it had not been suggested that these adjustable passages might provide a substitute for Caverhill's "cohering points" in producing the signs and symptoms of regular gout.

CONCLUSION

Though it is possible that gout is only one member of what is perhaps a rather large family of diseases affecting the autonomic vasomotor system, it does not thereby lose any of its intense individuality as a clinical entity. Father Balde's *dominus morborum et morbus dominorum* is still just as much a real individual as ever was the character of Podagra in Lucian's Gout Tragedy. Moreover, she can still make her challenge of invincibility to the therapeutists and thereby cause her victims to pray that they may be spared what Sydenham termed "the pompous garlands of medicines, with which such as are ready to expire are crowned, as though they were to be sacrificed like beasts."

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PLANTAR WARTS

A PLEA FOR RATIONAL TREATMENT

C. R. McLAUGHLIN
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E.M.S. SURGEON, PLASTIC SURGERY AND JAW INJURIES CENTRE, EAST GRINSTEAD

PLANTAR warts are both common and crippling; they are also essentially curable. Yet as a result of irrational treatment they are widely regarded as intractable and worthy of the radiotherapist's most ardent efforts; and these in turn often produce X-ray and radium burns of great severity, utterly disproportionate to such a simple condition. McIndoe (1947) reports a considerable number of these disasters, among 220 examples of radio-necrosis following treatment of benign lesions, all of which required plastic repair (see fig. 1).

Reputable dermatologists and some radiotherapists have long realised and publicised the unreliability and danger of radiotherapy for verrucæ (Windeyer 1947). They have emphasised the vicious process whereby a patient with a resistant wart receives an ineffective dose of, say, 900r; and then, dissatisfied, demands more treatment, often from a second radiotherapist who is uncertain of the previous dosage. To quote three authorities:

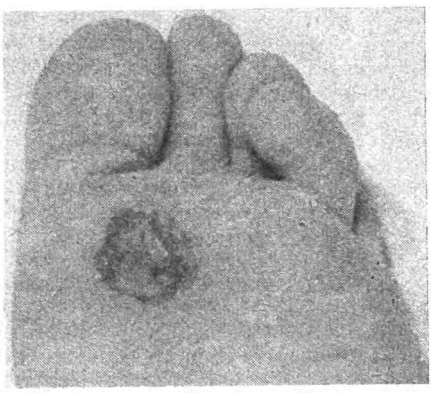


Fig. 1—X-ray burn of a year's duration following therapy for plantar wart. Note secondary deformity of forefoot due to extreme discomfort in walking.

> "A wart which resists a dose of 800–1200r will not be cured by repetition of the dose, and there is very grave risk of an X-ray burn" (Roxburgh 1944).
>
> "The necessary dose (of X rays or radium) verges on the danger zone, and I have seen exceedingly painful and sometimes long delayed radiodermatitis. . . . The use of X rays in maximal or super-tolerance dosage is only justified in cases of rodent ulcer or other malignant conditions, and certainly not for a banal infection like the common wart" (Semon and Moritz 1946).
>
> "We have seen many bad results following a single large dose (1200r or more) or repeated smaller doses. Plastic surgeons are busy repairing these injuries" (MacKee and Cipollaro 1946).

Nevertheless there is still a general reluctance to face the stubborn fact that many plantar warts are insensitive to safe doses of X rays. MacKee and Cipollaro claim only 51% cures in 96 cases treated by this method. This may explain the widely varying estimates made by experts of the minimal effective dose.

On the other hand, there is much uncertainty regarding the best alternative treatment. Methods vary from the futile to the mutilating, from the silver-nitrate stick of the harassed practitioner to the multiple excisions of the over-enthusiastic casualty surgeon, which may keep the victim in bed for two months.

Fortunately there is general agreement among leading dermatologists that combined curettage and cauterisation is the best method of attack, that it is effective in all cases where properly carried out, and that secondary repair of a resultant ulcer is scarcely ever needed. Even so, there is some ambiguity about precise technique, and a tendency to carry out this simple operation in a casual and perfunctory manner. It is, however, of particular importance here to pay close attention to detail. The method to be described has been extensively used for several years and has given complete satisfaction to patient and surgeon.

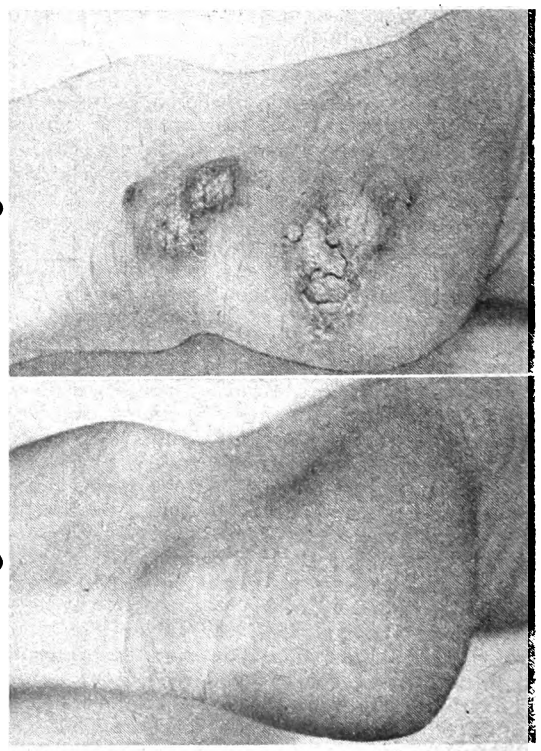
TECHNIQUE

A local anæsthetic is preferred, since this minimises bleeding and helps to define the layers. With a no. 11 blade the overlying horny skin is pared down until the typical bundles of the wart are clearly defined. A Volkmann spoon, the exact size of the wart, is then selected, driven into the foot at the edge of the wart, and swept round so that the core is shelled out complete. The hyperkeratinised collar at the neck of the cavity is trimmed with scissors, and the hole converted into a "saucer." The base, which is tough, must then be scraped until smooth and repeatedly touched with a diathermy needle or an electric cautery, using a fine point (not too hot) with a light touch. This is a most essential step, which prevents recurrence and controls bleeding. The needle may be boldly plunged into any tiny satellite warts, but there should be no indiscriminate "frying" of the base of a large verruca. A small wick of ribbon gauze is inserted into the cavity and the area covered with gauze and 'Elastoplast.' The patient can usually walk with care immediately; and, after the plug has been removed in 48 hours, there should be little discomfort. Healing is usually complete in 7–10 days. With R.A.F. patients 48 hours on "light duties" sufficed in most instances.

The case cited here may serve as an extreme example of the wide scope of this procedure.

ILLUSTRATIVE CASE-RECORD

A R.A.F. officer, aged 25, was admitted with warts on his right heel of 6 years' duration. Subsequently the fingers and anus had become infected. The heel had been treated 2 years previously by diathermy (without curettage), and later by X rays, an unspecified daily dose being given for 10 days. The inefficacy of all these treatments can be gauged from the condition shown in fig. 2*a*. There was an exceptional degree of hyperkeratosis.



(*a*)

(*b*)

Fig. 2—Multiple warts on heel (*a*) before and (*b*) after curettage and diathermy.

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It was considered that any procedure sufficiently radical to achieve permanent success might easily leave an ulcer too deep to heal without a cross-leg flap, since healing in this area is notoriously sluggish. However, the usual technique was followed, and the whole area treated at one sitting. Only minimal paring and cauterisation were required afterwards, and the standard of the final result is indicated in fig. 2*b*.

CONCLUSIONS

These trivial yet widespread and painful lesions should, at long last, be taken seriously. The simple method described is wholly satisfactory if carried out with care, and it should be well within the scope of any doctor accustomed to minor surgery. It is high time that the many victims of this condition were spared endless visits to a chiropodist, or (at the other end of the scale) a protracted acquaintance with the art of the reconstructive surgeon. It is surprising that substantial damages for X-ray burns are so seldom claimed; a few cases of successful litigation might achieve a change of policy which is long overdue.

SUMMARY

The dangers of treating plantar warts with X rays and radium are discussed.

A combination of curettage and diathermy is recommended as a safe and efficient alternative.

The technique is described, with an illustrative case.

I am indebted to Sir Archibald McIndoe for his helpful interest in this paper.

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LIVER DISEASE IN JOHANNESBURG

RELATION TO PELLAGRA

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PELLAGRA in African infants and adults is almost invariably associated with various grades of liver disease, amounting in about 10% of cases to advanced cirrhosis (Gillman and Gillman 1945). Moreover, after the acute signs and symptoms have resolved, many patients are discharged from hospital as clinically cured even though biopsy has almost consistently revealed the persistence of liver damage, particularly in adults. In some cases there was unmistakable evidence that the deposition of iron was steadily progressing. This being the case, and in view of the prevalence of malnutrition, it became essential to obtain information about the incidence of liver disease in the general population of Africans and Europeans in Johannesburg.

Prof. A. Sutherland Strachan had informed us that 4 out of every 5 necropsies of Africans at the morgue of the General Hospital, Johannesburg, showed signs of liver disease of some sort, including hæmochromatosis. We have substantially confirmed this. However, it might be argued that the lesser grades of liver disease seen at necropsy might easily have been related in some way to the immediate cause of death. Whether such criticism is valid or not, it is evident that, to estimate the incidence of liver disease among the general population, the livers of Africans and Europeans dying from trauma must be examined. In such cases it can be presumed that the persons were probably in good health at the time of death.

We therefore selected the livers from 1000 consecutive necropsies at the Medico-legal Laboratories, Johannesburg, excluding all cases where death could not be directly attributed to trauma or other accidental causes. The European group, consisting of 90 cases, was rather small but large enough to indicate the incidence of liver disease in this section of the population. For obvious reasons we have restricted this survey to persons over the age of 10 years.

We have classified the livers according to the presence of abnormal amounts of iron and/or fat, and the presence of cirrhosis with and without pigment or fat. Passing mention is made of other types of liver disease seen in this series. In this way it is easier to assess the incidence of liver disease among the African and European population and to relate these findings to our previous observations on pellagrins. Moreover, our observations on the incidence of cytosiderosis with or without cirrhosis in Africans are compared with the splendid data collected by Sheldon (1935) on hæmochromatosis.

Altogether 261 African and 90 European livers were examined. Blocks of tissue were fixed in formalin, dehydrated through alcohols, and embedded in paraffin. One set of sections was stained with hæmatoxylin and eosin and another subjected to treatment according to the method described by Dry (1945) for demonstrating iron pigment. Almost 100 of these livers were examined chemically for iron.

NORMAL LIVERS

The livers of 33 (12·6%) of the 261 Africans from the general population dying accidentally were free from any type of observable pathological process (table I). The lesions in most of the remaining 228 (87·4%) livers could be classified, on histological criteria, into the four types already described as occurring among pellagrins (Gillman and Gillman 1945, Gillman et al. 1945).

Though we do not regard even small amounts of histologically demonstrable fat or iron as inconsequential, particularly in young people over 1 year of age, nevertheless for the purposes of this survey we are accepting as normal livers those either with mild fatty change or classified as a mild type 2. In these instances the iron, estimated chemically, was below 0·1% dry weight. All the other subgroups of the type-2 livers, as well as the type-3 and type-4 livers, contained more than 0·25% of iron and even as much as 5·0%. As indicated previously, these livers are classified mainly on the presence, amount, and distribution of iron.

Even if the mild fatty livers and mild type-2 livers are regarded as normal, the livers of 87 (33·3%) Africans were free from demonstrable liver disease. The remaining 174 (66·6%) Africans had had severe liver disease (moderate and severe type-1 and moderate and severe type-2 livers, and all livers classified as type 3 or cirrhotic). By contrast, 29 (32·2%) of the European livers were pathological, and 61 (67·8%) were classified as normal (table I).

Age-distribution.—Of the 75 Africans under 30 years of age the liver was normal in 16 (21%), whereas in the 186 Africans over the age of 30 the liver was normal in 17 (9·1%). Among the Europeans the reverse was true, as almost all the livers of persons under the age of 30 were normal, frank liver disease appearing after the age of 30.

TYPE 1—FATTY LIVERS

As in the adult pellagrins, fatty livers were comparatively rare in adult Africans of the general population. This type of lesion was present in 7 (2·7%), and was severe only in 1 adult, whereas among the Europeans fatty livers were found in 12 (13·3%).

TYPE 2—IRON IN THE LIVER CELLS

In the general population of Africans the commonest liver lesion was that categorised as type 2, which was found in 119 (45·7% of the total African cases, or 52% of all Africans with liver disease). This form of hepatic damage therefore occurs as frequently in the general

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TABLE I—ANALYSIS OF LIVER PATHOLOGY IN 90 EUROPEANS AND 261 AFRICANS DYING FROM ACUTE TRAUMA

Age (yr.)	Race	Total cases	"Normal" livers	Type 1			Type 2			Type 3			Type 4 (cirrhosis)	Other pathological lesions			
				Mild	Moderate	Severe	Mild	Moderate	Severe	Mild	Moderate	Severe		a	b	c	d
10–19	E	10	9	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	A	9	4	0	1	0	2	0	0	1	0	0	0	0	0	1	0
20–29	E	13	9	0	0	0	3	0	0	0	0	0	0	1	0	0	0
	A	66	12	0	1	0	19	16	3	3	3	3	1	3	1	0	1
30–39	E	18	5	0	3	3	4	2	0	0	0	0	0	0	1	0	0
	A	103	12	1	0	1	24	14	14	4	16	7	9	0	0	0	1
40–49	E	11	3	0	1	0	6	1	0	0	0	0	0	0	0	0	0
	A	49	2	1	1	0	6	8	9	3	7	6	5	0	1	0	0
50–59	E	17	4	0	2	0	7	2	1	0	0	0	1	0	0	0	0
	A	23	2	0	1	0	0	2	1	3	4	3	7	0	0	0	0
60–69	E	14	4	0	1	1	3	3	0	0	1	0	0	0	1	0	0
	A	3	0	0	0	0	1	0	0	0	2	0	0	0	0	0	0
70–79	E	7	4	0	1	0	0	0	1	0	0	0	1	0	0	0	0
	A	4	0	0	0	0	0	0	0	0	1	2	1	0	0	0	0
80–89	E	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	A	4	1	0	0	0	0	0	0	0	1	0	2	0	0	0	0
Total	E	90	38	0	8	4	23	8	2	0	1	0	2	1	3	0	0
	A	261	33	2	4	1	52	40	27	14	34	21	25	3	2	1	2

E, Europeans. A, Africans. a, bilharzia. b, necrosis. c, carcinoma. d, tuberculosis.

population as it does among Africans admitted to hospital with pellagra (table II). In the general African population, however, the type-2 liver occurred chiefly in the third, fourth, and fifth decades, being most common (44%) in the fourth decade. In the pellagrins the disease was most common (50%) in the third decade. This suggests that cytosiderosis develops somewhat earlier in Africans who break down with frank pellagra than among the general population who, though also malnourished, have not been admitted to hospital with the acuter forms of nutritional diseases.

Type-2 livers are commoner among Africans (45·7%) than among Europeans (36·6%). Tables I and II show that the type-2 livers can be expected mainly in Europeans aged 40–60, and in Africans aged 20–40. Moreover in Africans cytosiderosis was usually more severe. Thus, 67 (56·3%) out of 119 type-2 livers in Africans were classed as moderate or severe, against 10 (30·3%) out of 33 in Europeans. Moreover, 7 of the 10 Europeans with moderate or severe type-2 livers were more than 50 years old, whereas 64 (94%) of the Africans with this degree of cytosiderosis were under the age of 50, and 47 (70%) were less than 40 years of age.

TYPE 3—CYTOSIDEROSIS WITH SECONDARY SIDEROSIS

Since our initial study of the structure of the liver in pellagra we have learnt two further facts about cytosiderosis: (1) cirrhosis can supervene at any stage in the course of cytosiderosis and not only when the liver becomes intensely pigmented (Gillman et al. 1945); and (2) the appearance of masses of pigment in Kupffer's cells and in histiocytes in the portal tract represents a new turn in the evolution of the pathological process resulting from the entry of iron pigment into the circulation with true siderosis as a consequence. This siderosis could also develop at any stage in the evolution of cytosiderosis (Gillman and Gillman 1947). Both reactions —namely, cirrhosis and siderosis—represent distinct landmarks in the progress of the disease. Siderosis, when it complicates cirrhosis, leads to the end-picture of cytosiderosis plus cirrhosis with siderosis according to our nomenclature, or hæmochromatosis of other investigators (Sheldon 1935). Siderosis, cytosiderosis, and cirrhosis are often present in the same person. To emphasise the difference in the pathogenesis of this stage of the disease, we propose to examine cytosiderosis plus siderosis separately as represented by our original type-3 livers.

The accumulation of iron pigment in the form of clumps in Kupffer's cells and in histiocytes of the portal tracts is the result of true siderosis, the second stage of cytosiderosis (Gillman and Gillman 1947). Such type-3 livers were seen in 69 (26·4%) of the Africans (table I). This type of liver, like type-2, therefore occurs as frequently among the general African population as among African pellagrins.

Tables I and II show that this stage of hepatic cytosiderosis tends to occur a decade earlier among African pellagrins than in the general African population, suggesting that the earlier the onset of the pellagra, the more rapidly does the cytosiderotic lesion pass into the second stage of the disease. On the other hand, these findings may indicate that with the early onset of liver disease the more likely is the patient to break down with pellagra or some other related nutritional syndrome.

Cytosiderosis in Europeans in this series rarely advanced beyond the mild type-2 stage. Since a type-3 liver was recognised in 1 European, and type-2 livers in 33, it can be affirmed with some confidence that cytosiderosis is not usually a progressive disease among Europeans as it is among Africans in Johannesburg.

TYPE 4—HÆMOCHROMATOSIS (CYTOSIDEROSIS, WITH OR WITHOUT SIDEROSIS, PLUS CIRRHOSIS)

Table I shows that cytosiderosis complicated by cirrhosis, or vice versa, was over four times more frequent among the Africans (9·6%) than among Europeans (2·2%) who died of accidents. Even this advanced type of disease manifests itself much earlier in Africans than in Europeans. Tables I and II show that, of the 25 cases in Africans who died of trauma and the 21 cases in pellagrins, 30 (65%) were in persons aged 20–40. This high incidence of cirrhosis in Africans is very similar to that reported by Stacey (1944) among the malnourished fellaheen of Iraq. In Stacey's cases, however, the cirrhosis was not complicated by cytosiderosis.

Sheldon (1935) makes the following remarks concerning the age-incidence of hæmochromatosis among 290 European cases reported in the literature:

"It will be seen from chart 1 that hæmochromatosis has a remarkable age-incidence.

(*a*) It is unknown before the age of 20 years, when two instances are reported. . . . The maximum age is 72 years. . . .

(*b*) The disease has a sharply graded incidence between these limits. The maximum number of cases occur

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in the decade of 45–55 (122 cases, or 42%) and on either side there is a fall in incidence as the extremes are approached. The fall is much steeper on the right hand side, there being only 60 cases above the age of 55, as against 108 cases below 45. The curve does not show a random variation around the average, and it is clear that after the age of 20 there is an increasing tendency to the development of hæmochromatosis, which reaches a maximum between 45 and 55. The rapid diminution after the age of 55 is presumably attributable to the smaller number of susceptibles in the population, 80% having already died. The absence of the disease below the age of 20, and its increasing incidence until the period of 45–55, must be regarded as an essential feature of the natural history of hæmochromatosis.

(c) The age-incidence is different in the female cases from that of the male. . . . The age-incidence appears . . . to be later in women than in men."

Both in our series of cases and in Sheldon's, hæmochromatosis is uncommon under the age of 20. In Africans the maximum incidence becomes manifest ten years earlier than in Europeans. Sheldon has suggested that the sharp drop in the incidence of hæmochromatosis in the older groups may be due to the smaller number of susceptible individuals still living after the age of 55. Burger (1944) remarks:

"In Benoni, on the Witwatersrand, the medical officers report that the death-rate among Europeans is 7·60 per 1000, and for natives it is 20·58, while the expectation of life for a European is 60 years, as compared with 36 years for a native. Of native deaths, 67% are said to be from disease associated with undernourishment."

It is interesting and probably significant that, despite the early age at which the African develops severe cytosiderosis with cirrhosis of the liver, the disease is still apparently rare under the age of 20. We have not had a sufficient number of livers from Africans aged 10–20 years to be able to pass an opinion about the age at which this disease of the liver may begin. Cytosiderosis has not yet been observed in persons younger than 6 years. As we have indicated previously, it seems that, between the ages of 6 and 12 years, the reactivity of the African to chronic malnutrition is profoundly modified, as is expressed in the clinical manifestations as well as in the pathological reactions in the liver. The extent to which cytosiderosis is excluded by the type of metabolism emphasised immediately before and after puberty still remains to be determined.

The limited data available (see table II) indicate that hæmochromatosis is at least as common among female as among male Africans, though cirrhosis tends to develop at a slightly later age among the women. This is also our clinical impression of the incidence of decompensated portal cirrhosis in African women. Unfortunately, the great majority of persons who came to necropsy at the Medico-legal Laboratories were males; therefore these figures do not provide any useful information about the sex-incidence of liver disease among this sample of the general population.

As with type-2 and type-3 livers, the type-4 livers (cirrhosis superimposed on cytosiderosis or vice versa) develop ten years earlier among pellagrins than among Africans in the general population. In pellagrins 12 (56%) of the 21 type-4 livers appeared in persons aged 20–29, and 8 (38%) in persons aged 30–39. Thus 20 (95%) of the 21 frankly malnourished subjects with pigmented cirrhotic livers were under the age of 40, as against 10 (40%) of the 25 Africans dying accidentally. Pigmentation and cirrhosis of the liver are therefore much more extensive and more prevalent in pellagrins than in members of the general African population not suffering from acute malnutrition.

OTHER TYPES OF HEPATIC LESIONS IN AFRICANS

We have also examined other types of liver disease in patients dying suddenly and therefore coming to necropsy at the Medico-legal Laboratories. Bilharzia ova were identified in three livers, and in two there was a moderate degree of apparently active cirrhosis. It is unlikely that parasitic infection can be related causally to hæmochromatosis as previously emphasised.

Hæmorrhagic necrosis was found in two of the apparently healthy African subjects, and in two cases tuberculous nodules were observed in the hepatic parenchyma. We are satisfied that hæmorrhagic necrosis is not a factor of any importance in the production of cytosiderosis or of cirrhosis in the African, for this lesion has been seen in only 9 of 600 African livers thus far examined.

Cirrhosis in Africans is not apparently the result of long-standing fatty change, as is apparently the case in many Europeans, as described by Connor (1939) in chronic alcoholism and diabetes. Actually, among these so-called normal Africans only 7 of the 261 cases contained significant amounts of fat, as against 12 in 90 European cases.

TABLE II—CLASSIFICATION OF MAIN HISTOLOGICAL FEATURES IN THE LIVER-BIOPSY SPECIMENS REMOVED FROM 217 AFRICAN PELLAGRINS ON THE DAY OF ADMISSION TO HOSPITAL

Histological findings	Sex	Liver type and decade of life																				Totals	
		Type 1				Type 2						Type 3					Type 4						
		I	II	III	IV	I	II	III	IV	V	VI	I	II	III	IV	V	I	II	III	IV	V		
No fat	M	—	—	—	—	—	—	9	7	—	1	—	—	6	5	1	—	—	3	1	—	33	
	F	—	—	—	—	—	1	4	4	2	—	—	—	—	1	—	—	—	—	1	—	13	46
A*	M	3	1	—	1	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	6	
	F	3	—	—	—	—	—	2	1	—	—	—	—	—	1	—	—	—	1	—	—	8	14
B	M	14	—	1	—	—	—	—	1	—	—	—	—	2	—	—	—	—	—	1	—	19	
	F	9	—	—	—	—	—	—	1	—	—	—	—	2	2	—	—	—	1	1	—	16	35
C	M	1	—	—	—	—	1	4	2	—	—	—	—	—	1	—	—	—	1	—	—	10	
	F	6	—	1	2	—	—	3	3	—	—	—	—	3	—	1	—	—	1	2	1	23	33
D	M	—	—	1	—	—	—	6	2	—	—	—	—	4	6	—	—	—	—	—	—	19	
	F	—	—	2	2	—	—	3	—	1	—	—	—	1	2	—	—	—	—	—	—	11	30
E	M	—	—	—	—	—	—	2	1	1	—	—	—	6	4	1	—	—	—	1	—	16	
	F	—	—	—	2	1	—	4	1	2	—	—	—	1	3	—	—	—	3	—	—	17	33
F	M	2	1	—	—	—	1	3	4	—	—	—	—	1	2	—	—	—	1	—	—	15	
	F	1	—	1	—	—	1	1	2	1	—	—	—	2	—	—	—	—	1	1	—	11	26
Totals	M	20	2	2	1	—	2	25	17	1	1	—	—	19	18	2	—	—	5	3	—	118	
	F	19	—	4	6	1	2	17	12	6	—	—	—	9	9	1	—	—	7	5	1	99	
Both sexes		39	2	6	7	1	4	42	29	7	1	—	—	28	27	3	—	—	12	8	1	217	217

* Distribution of fat as described by Gillman and Gillman (1945). "B" represents intensely fatty liver.

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DISCUSSION

From this survey it is apparent that many Africans, not manifesting acute signs of malnutrition, were capable of hard manual work, up to the time of the fatal accident, even when the iron content in their liver amounted to 0·5–5·0% of the dried weight of the liver (severe type-2, type-3, and type-4 livers). Such concentrations of iron are equal to those reported in hæmochromatosis (Sheldon 1935) and therefore indicate severe hepato-cellular damage.

We have already indicated that iron deposition is a notable feature of pellagra; but, in view of the high incidence of cytosiderosis in the livers of so-called healthy individuals, pigment formation can apparently proceed even in the absence of overt manifestations of this form of severe malnutrition. It is apparent, therefore, that in the general population of Africans some types of stimuli are maintaining a perverse intracellular metabolism having as one end-result the deposition of iron pigment.

Thus the metabolism of the African can be profoundly disturbed without expressing itself in a form sufficiently severe to cause the affected person to seek medical attention. This perverse metabolism can silently destroy the tissues to such an extent that the patient first becomes severely ill and presents himself at the hospital when he already has an advanced hepatic cytosiderosis with or without cirrhosis; cirrhosis may be discovered accidentally in a patient dying from intercurrent infection.

At any stage during the progress of this pathological process, which to the untrained observer does not express itself clinically, an acute attack of pellagra may be suddenly precipitated. This explains the diversity of liver pictures presented by pellagrins on admission to hospitals. The high incidence of liver disease among apparently healthy Africans, and the frequent existence of more extensive liver damage in African pellagrins, lead us to suggest that "mild" stigmata of nutritional disease, even in young Africans, in the hospitals probably indicate the existence of an active disease associated with gross pathological changes in the liver.

It is to be expected from the present survey that the number of patients admitted to this hospital, and subsequently dying with the clinical manifestations of cirrhosis, should be extremely high. Becker (1944) has shown that African patients dying of cirrhosis and coming to necropsy at the Johannesburg Hospital are twice as numerous as Europeans. Of the Europeans 3·8% died of clinically recognised cirrhosis confirmed post mortem, as against 6·3% of Africans. Moreover, our studies of the livers of 217 pellagrins and 261 apparently "normal" Africans revealed the high incidence of pigmentary changes amounting to frank hæmochromatosis in 9·6% of cases. Becker remarks that of the European cirrhotics only a tenth were of the pigmentary variety, whereas in Africans hæmochromatosis was found in 50% of cirrhotics.

Becker (personal communication) informs us that in his analysis he confined his attention only to persons dying of clinical manifestations of portal cirrhosis, and that he did not take into consideration the incidence of cirrhotic livers in patients who showed no clinical evidence referable to the liver. Our survey has revealed that it may be extremely difficult to discriminate, even on histological criteria, between the various grades of liver disease. Moreover, not all individuals suffering from cirrhosis exhibit signs and symptoms referable to the liver. Ratnoff and Patek (1942) have shown that in 137 of 213 cases of Laennec's cirrhosis death was directly attributable to the cirrhosis, whereas Eppinger (1937) found that, of 135 patients with cirrhosis, 16% were said to have died of gastro-intestinal hæmorrhages, 16% of "heart-failure," 16% in "coma," and 10% of tuberculosis. Evans and Gray (1938) reported that in 37% of their cases death was caused by gastro-intestinal hæmorrhage, and in only 12% by "liver insufficiency." Rolleston (1905) remarks:

> "that in patients with cirrhosis which has not yet produced ascites, death may be due to a number of complications which frequently throw any symptoms due to cirrhosis into the shade. . . . In about 12–14% of cases with cirrhosis, death is directly due to pulmonary tuberculosis: in many of the cases cirrhosis is latent and is only discovered after death."

Sheldon's remarks are also highly significant in this regard:

> "An analysis of the cases (of hæmochromatosis) occurring at an early age shows a tendency for death to have been caused by some extraneous condition, the hæmochromatosis having been symptomless and discovered, often with surprise, at post-mortem."

Since patients coming to necropsy may show no clinical signs of cirrhosis but may have died from other causes, it is probable that extensive chronic liver disease is much more common in the African dying in hospital than Becker's necropsy figures indicate. This is certainly evident from our surveys.

Though the disease of the liver may not be sufficiently advanced to be recognised clinically as cirrhosis, nevertheless the great increase in the amount of iron represents a profound metabolic disturbance. Such a disordered metabolism can therefore easily predispose to diseases of other organs. It is more than likely that the high incidence of tuberculosis, and the rather acute course which this disease runs in Africans, are in no small measure related to the altered metabolism in the African, initiated primarily by chronic malnutrition, especially since tuberculosis is often a fatal complication in European cirrhotics.

Our statistics show that in Africans frank hæmochromatosis develops mainly in patients aged 30–50; but we have seen cases in persons under 30. However, in our series, most Africans aged 20–40 also showed evidence of chronic liver damage amounting, in many instances, to precirrhosis when not frankly cirrhotic. The statistics obtained from hospital records indicate that persons aged 20–40 constitute over half of the total number of patients dying in hospital. We therefore suggest that the incidence of clinically recognisable cirrhosis among Africans would be considerably higher if the persons aged 20–30 with severely damaged livers (types 2 or 3) lived longer. On the other hand, it is also to be remembered that the disease may become temporarily arrested at any stage, and the switch over from the type-2 liver to the type-3 and type-4 livers might thus be delayed.

However, our experience of pellagrins indicates that advanced liver disease does not easily resolve. Though we have reason to believe that type-2 and even mild type-3 livers may heal in favourable circumstances, we doubt whether such livers are ever restored to normal in the economic conditions in which these Africans live. Moreover the steady passage of relatively inert pigment of large molecular size into the circulation cannot be without consequences (Gillman and Gillman 1947). Large inert molecules injected intravenously in several different kinds of animals can lead to a series of reactions which Hueper (1942) has included in the macromolecular syndrome. These reactions may also become manifest as arteriosclerosis. The evidence available from our own work seems to indicate that the large inert iron-containing molecule could easily complicate the primary metabolic disorder associated with liver disease and thus prepare the background for the development of premature arteriosclerosis, cirrhosis of the liver, keloid formation, reticulosis, &c., all of which are known to be prevalent among Africans (Gillman et al. 1947). Moreover the

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blocking of the reticulo-endothelial system by such molecules could also explain the more rapid progress and the acute character of tuberculosis in the African. Though, in our own cases, the circulation of macromolecules was greatly facilitated by the presence of a stainable iron moiety, it is likely that in other forms of malnutrition similar, though non-iron-containing, inert macromolecules might easily be poured into the circulation and thus contribute also to premature arteriosclerosis, long known to be common among malnourished persons (Lavinder and Babcock 1910). At any rate it is evident that chronic malnutrition, whether it expresses itself as pellagra or as some other syndrome, predisposes to liver disease as well as to other metabolic diseases which permit the emergence of cirrhosis and other fibrous-tissue reactions in other organs and tissues of the body.

SUMMARY

Attention is drawn to the very high incidence of severe liver disease in presumably healthy Africans in Johannesburg as compared with Europeans.

The liver disease in the African is similar to that previously reported in pellagrins.

In Africans of the general population advanced liver disease develops at least 10 years earlier than in Europeans, and 10 years later than in pellagrins.

Pellagra among Africans in Johannesburg is associated with severe liver disease in relatively young persons.

The fatty liver is much commoner in adult Europeans than in Africans.

Neither the fatty liver nor hæmorrhagic necrosis can be regarded as the precursor of cirrhosis with or without cytosiderosis.

The consequences of cytosiderosis when complicated by siderosis are briefly examined in the light of current knowledge relating to the macromolecular syndrome.

It is suggested that in malnutrition the entry of macromolecules into the circulation by the route described could play a part in promoting premature arteriosclerosis, keloid formation, and overgrowths of fibrous tissue in other organs and tissues, including the liver.

We wish to acknowledge gratefully the encouragement and stimulation of Prof. R. H. MacIntosh, of the Medico-legal Laboratories, without whose coöperation and interest this work would have been impossible. Our thanks are due also to Prof. Raymond Dart, who has kindly encouraged this investigation. The Social Services Society of the University of the Witwatersrand has generously contributed financial assistance.

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"... Very little is known regarding the existence of any specific nutritional requirements of any kind of tumor, except the hepatoma in the rat, where diet exerts a very significant effect. In view of the fact that specific dietary factors are required for the maintenance, reproduction, and growth of normal cells and that the metabolic pattern of malignant tissue is quite specific and may be found to be more so, it would seem to be advisable to cultivate this field intensively in man as well as animals."—A. C. IVY, *Science*, 1947, **106**, 455.

ARTIFICIAL PNEUMOTHORAX

SURVEY OF 150 INDUCTIONS ON OUTPATIENTS

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IN 1943 the large hospital waiting-list for patients with pulmonary tuberculosis in Glasgow included cases which, if admitted at once to hospital, would be considered suitable for treatment by artificial pneumothorax (A.P.). Since the prospect of early admission was poor, and under ordinary home conditions the tuberculosis would probably extend, it was decided to treat such patients by A.P. as outpatients. The primary object was to provide early treatment, but it was also hoped to save hospital accommodation.

Four beds were reserved in Baird Street Auxiliary Hospital, to which selected patients were admitted. The A.P. was induced on the day of admission, and the first and second refills were given on the two following days. Some hours after the second refill the patients were taken home by ambulance, having been instructed to continue complete bed rest and to return for the third refill on the fifth or sixth day after induction. Subsequent refills were given at weekly intervals. In general, the cases selected had small unilateral lesions, but circumstances induced us to include some patients in whom the tuberculosis was quite advanced in one lung, often with cavitation, and some in whom tuberculosis was detected in the other lung during treatment of one lung by pneumothorax originally induced in hospital.

This is a record of the results in our first 150 consecutive cases. The time covered by these inductions ranges from July, 1943, to August, 1944; the results have been assessed after observation periods of 20–33 months. The 150 patients admitted for induction during this period comprised 66 males and 84 females. The average age of the male patients was 23 years, the oldest being 42 and the youngest 14 years. In females the average age was 23 years, the oldest being 45 and the youngest 14 years. The cases are placed in three groups: (1) successful, in which treatment was followed by restoration to normal health and in many cases to working capacity; (2) doubtful, in which assessment was unreliable; and (3) unsuccessful, in which no favourable response to treatment can be claimed. The numbers in each group are as follows:

	Successful	*Doubtful*	*Unsuccessful*	*Total*
Male ..	30	—	36	66
Female ..	52	5	27	84
Total ..	82	5	63	150

During the period from July, 1943, to August, 1944, 2693 new cases of pulmonary tuberculosis were registered in Glasgow. Our series of 150 cases therefore represents 5·6% of the total.

Though these 150 patients are only a fraction of all patients treated by A.P. as outpatients since 1943, the survey has been limited to this number to ensure a reasonably adequate period of observation after induction.

SUCCESSFUL RESULTS (82 PATIENTS)

Types of Collapse.—The results of collapse therapy were as follows:

(1) With complete pleural separation: 30 patients (11 male, 19 female). In these no additional measures were required.

(2) With string or band adhesions: 42 patients (17 male, 25 female). In general the adhesions were not massive and did not interfere with an effective collapse. In 3 patients (1 male, 2 female), however, adhesions were divided.

(3) With a lobe partly adherent: 10 patients (2 male, 8 female). In most of these cases the pneumothorax was

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sufficiently selective to justify continuation of refills. In 2 female patients, however, collapse of the diseased portion of the lung was poor. Refills were discontinued in one of them after four months, and she was later admitted to hospital, where a phrenic crush was performed; the other patient still attends for refills after a year and ten months. Though the results in these 2 cases, therefore, seemed doubtful, both patients are now fit and have resumed work, and it is probable that pneumothorax had at least an initial controlling influence on their tuberculosis.

Mode of Detection.—Of the 82 patients, 6 (all male) had been discovered by mass radiography in the Services and discharged to their homes; and 2 (1 male, 1 female) by full-size radiography; all of these were asymptomatic. In 74 patients (23 male, 51 female) detection was preceded by symptoms of the usual diversity. The average duration of these symptoms before induction was three and a half months, with extremes of two weeks and two years.

Pain.—In relation to successful induction of A.P., thoracic pain is probably the symptom of first importance. In 16 cases pain figured either alone or, more usually, among other symptoms. In 14 of these the pain was ipsilateral, and induction and subsequent refills were carried through to a successful conclusion, though 10 showed either adhesions or, at a later stage, obliterative pleuritis. It appears, however, that a complaint or history of pain does not preclude the possibility of a successful lung collapse on the same side. In 2 cases the pain was on the side of the normal lung, a phenomenon which is in our experience not uncommon.

Sputum-conversion.—In 42 patients (21 male, 21 female) the sputum was negative, and 17 (6 male, 11 female) never had any sputum. In the remaining 23 (3 male, 20 female) the sputum was positive; conversion was obtained in 17 (3 male, 14 female), and 6 (all female) became sputum-free.

Pleural Effusion.—Fluid was noted in 48 patients (22 male, 26 female). In 42 (21 male, 21 female) the fluid was minimal and of no consequence. In 3 (all female) it was moderate—i.e., no higher than the fifth costal cartilage; in 2 of these it was absorbed completely without interference, and in the third case absorption followed a later phrenic crush in hospital but left much obliterative pleuritis. In the remaining 3 cases (1 male, 2 female) the effusion was large. In the male patient it followed section of adhesion in hospital; after aspiration, refills were unsatisfactory and were discontinued, but the end-result was good. Complete absorption resulted in the 2 females on strictly conservative treatment without aspiration.

Duration of A.P.—In the 82 cases the average duration of A.P. is seventeen months to the time of assessment. The extremes are six weeks and thirty-one months:

(1) A girl, aged 16 years, who complained of chest pain and night sweats, and in whom an early lesion was found below the right clavicle, had an A.P. induced four weeks after the onset of symptoms, and a good general collapse was obtained. Refills were continued for six weeks, when a moderate effusion was noted. This gradually diminished without aspiration but left much obliterative pleuritis. Despite the fact that further observation did not reveal any sign of activity in the lesion, she was later offered sanatorium treatment as a measure of safety because of her somewhat poor general condition but took her own discharge after only five days' residence. Although still rather thin and having gained only 4 lb. in a year and nine months, she remains symptom-free on domestic work, and her tuberculosis is inactive and unilateral.

(2) The other patient, also a girl, now aged 20, still attends for refills after thirty-one months' entirely outpatient treatment, and her condition is very satisfactory.

Admission to Hospital.—Before this scheme was introduced, it was agreed that patients so treated would in due course receive the offer of orthodox institutional treatment if this became available. Cases, moreover, showing poor response were to be admitted with priority, and any menacing incident during the induction phase was to be dealt with by immediate admission. Fortunately, no immediate admission was called for in the entire series. Out of the 82 patients in whom the results were successful, 17 (5 male, 12 female) were later admitted for inpatient treatment, either because of a routine offer which was accepted (12 patients), or because of some doubt regarding their progress as outpatients (5 patients). Their average duration of residence was six months, with extremes of five days and twelve months. The remaining 65 patients have received outpatient treatment only, in many cases by their own expressed wish.

DOUBTFUL RESULTS (5 PATIENTS)

In this small group no satisfactory conclusion could be reached, either because of poor coöperation or because of removal to a different part of the country. All 5 patients responded to treatment, and at least 1 has resumed work. Some circumstance in each case, however, combined with lack of precise information, made it impossible to classify the results except as "doubtful."

Sputum-conversion.—Of the 5 patients, 2 were sputum-positive and 3 sputum-free. The 2 patients with positive sputum reacted well while under observation, and when last seen their condition gave some support for the belief that sputum-conversion might have been achieved. It is not reasonable to claim conversion of sputum for any member of the group.

UNSUCCESSFUL RESULTS (63 PATIENTS)

In this group treatment was entirely unsuccessful, and these failures may be classified in four categories:

(1) *Death.*—There were 14 deaths (in 10 males and 4 females) attributable to tuberculosis. The average interval between induction and death was fifteen months, with extremes of six months and thirty-three months. The causes of death were spontaneous pneumothorax in 3, tuberculous meningitis in 2, abdominal tuberculosis in 1, and progressive bilateral lung disease in 8.

In the patient who died of abdominal tuberculosis the A.P. exerted a favourable control on the lung disease; and among the remainder, 4 were most uncoöperative in the earlier stages of their illness.

(2) *Failure of Induction Attempt.*—In 11 patients (6 male, 5 female) it was impossible to obtain any degree of lung collapse because the pleura was adherent over a wide area. In 5 of these patients (4 male, 1 female) there was an existing A.P. on the opposite side, and in each case the condition of the secondarily involved lung improved with the maintenance of the existing A.P. and with rest at home.

In another patient thoracoplasty was performed, with good results; 1 has been in hospital, and the condition has become stabilised with general treatment; 2 are unchanged; and 1 is awaiting admission to hospital.

The remaining patient died, more than a year after induction of A.P. was attempted, from an accidental cause unrelated to her lung disease, which had in fact become much less active.

(3) *Discontinuation.*—For various reasons refills were discontinued at the outpatient clinic in 30 patients (15 male, 15 female). The average interval between induction and discontinuation was seven months, with extremes of a week and twenty-two months.

Discontinuation resulted from numerous adhesions in 9 cases, from persistent fluid in 7, and from acute contralateral spread in 4. In 1 case discontinuation was premature and was followed by an exacerbation of the disease.

In 3 cases refills were stopped because 1 patient did not follow instructions, 1 patient was admitted to a mental-observation ward, and in 1 patient the tuberculosis was apparently inactive. The remaining 6 patients defaulted.

Though the treatment failed in these 30 patients, a later review of their conditions showed that in 13 the disease had improved, and 8 were considered suitable for other surgical

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measures, but 4 were unchanged, and 5 had deteriorated. Of the 30 patients, 6 (4 male, 2 female) had a coexisting contralateral pneumothorax.

(4) *Poor Response.*—In 8 patients (5 male, 3 female) the response to treatment after a reasonable trial has not been sufficient to suggest any prospect of ultimate success. Their disease remains active, and further attempts to control it have been rendered difficult by adhesions in 6, obliteration of the pleural cavity in 1, and persistent fluid in 1. At least half, however, should respond to the surgical measures which are contemplated.

Sputum-conversion.—In 17 patients (5 male, 12 female) the sputum was negative, and 11 (5 male, 6 female) were sputum-free. The remaining 35 (25 male, 10 female) had positive sputum; conversion was obtained in 5 patients (4 male, 1 female) despite their unsatisfactory response.

SPUTUM-CONVERSION IN THE ENTIRE SERIES

In the entire series of 150 cases, 60 (or 40%) were originally sputum-positive. After treatment, 22 of these (or 36·7% of the sputum-positive cases) were sputum-negative, and an additional 7 (or 11·7%) became sputum-free. The findings arranged according to results of treatment were as follows:

	Results of Treatment			
Before treatment:	*Successful*	*Doubtful*	*Unsuccessful*	*Total*
Sputum-positive..	23	2	35	60
After treatment:				
Sputum-positive..	0	1 (*50%*)	30 (*85·7%*)	31 (*51·7%*)
Sputum-negative	17 (*73·9%*)	0	5 (*14·3%*)	22 (*36·7%*)
Sputum-free ..	6 (*26·1%*)	1 (*50%*)	0	7 (*11·7%*)

Therefore, of all sputum-positive cases treated, sputum-conversion was obtained in 36·7%.

Though 60 of our 150 cases (40%) were originally sputum-positive, it is unfortunately impossible, owing to lack of information, to give an accurate comparative figure for the percentage of sputum-positive cases in the remaining 2543 patients registered during the same period, or any details regarding sputum-conversion in those cases after their treatment by other methods.

DISCUSSION

The unorthodox régime adopted in these cases will no doubt be criticised. It was adopted in Glasgow only to relieve a situation in which the alternative seemed to be almost complete inaction. We undertook the management of the scheme with considerable doubt, and we do not advocate it as a standard procedure. After making this survey, however, we consider that it has proved to be a useful and worth-while measure in abnormal and difficult conditions, and that it might well be adopted for suitable cases (1) when institutional accommodation is over-taxed; (2) when a patient refuses admission to an institution; or (3) when a patient, because of domestic or other difficulties, cannot accept admission.

This scheme can be followed on a considerable scale only in urban districts, but it could probably be used successfully in populous rural or semi-rural districts where transport is satisfactory. In sparsely populated or inaccessible rural areas there is little scope for it.

We feel impelled to add one further qualification. We consider that this régime should never be adopted unless it can be conducted by experienced tuberculosis officers of senior rank.

SUMMARY

A survey of 150 cases of pulmonary tuberculosis treated by artificial pneumothorax induced on an outpatient régime shows that 20–33 months after induction the result was satisfactory in 82 (almost 55%). In 65 (43%) of these this was achieved without any institutional treatment.

Of the 60 cases which were originally sputum-positive, treatment was followed by sputum-conversion in at least 22 (36·7%).

This mode of treatment is not recommended for general adoption, but it may be useful when institutional care is for some reason impracticable.

SEASONAL INCIDENCE OF RETARDED GROWTH IN CHILDREN WITH NUTRITIVE FAILURE*

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THE effects of inadequate diet in human beings have been studied at the nutrition clinic of Hillman Hospital, Birmingham, Alabama, since 1936. Though these studies were at first confined to adults, clinical signs and symptoms of nutritional deficiency diseases were observed in many of the children who accompanied their parents to the clinic, emphasising the familial nature of this condition. Most of the children seemed apathetic, thin, and small for their age, and the parents often complained that their children "just don't grow." Inquiries about the amount and kind of food eaten by these families indicated that few if any of the children had a food intake adequate for normal growth. In 1941 studies were initiated to investigate the effect of long-continued malnutrition on the growth of children living in a region where nutritional deficiency diseases have long been endemic.

We were interested in determining whether periods of retarded growth coincided with any particular season of the year, since it has been noted that the clinical manifestations of nutritive failure † appear most often in the late spring, summer, and early fall (Smith and Ruffin 1937, Youmans and Patton 1941, Spies and Butt 1942). Though several methods for studying growth are used in the nutrition clinic, we report here only the findings derived from Wetzel grid data.‡

MATERIALS AND METHODS

Selection of Patients.—We selected 108 white children aged 5–14 years from about 300 children under routine observation in the nutrition clinic. All the children

* University of Cincinnati Studies in Nutrition at the Hillman Hospital, Birmingham, Alabama. These studies were supported by grants from the American Dry Milk Institute, Inc., and Abbott Laboratories. We are indebted to Miss Ellie Jo Gilley for technical assistance.

† "The term 'nutritive failure' perhaps means different things to different physicians. It is used in our clinic to describe a variable clinical picture and does not have a specific physiological connotation. It does not indicate why the nutrition has failed but simply that it has failed.
"Our work has convinced us that many times the physician cannot determine at once the physiologic basis of the nutritional insufficiency, and by the use of this term he can describe briefly the clinical picture without knowing the precise causation. The term has become so commonly entrenched in our clinical usage that it does not seem wise for us to restrict it or to change it.
"For the sake of clarity, the various disturbances and mechanisms which create a picture of nutritive failure we often describe separately. We can see pellagrous dermatitis or glossitis, beriberi neuritis or beriberi heart disease, scorbutic hemorrhages or gingivitis, cheilosis or the ocular symptoms of riboflavin deficiency as present symptoms arising as a response of the body to a long-continued deprivation of certain nutrients in food. Hence, nutritive failure is a more inclusive term than pellagra, beriberi, scurvy, or riboflavin deficiency in that it connotes varying degrees of mixed deficiencies operating simultaneously" (Spies 1945).

‡ The Wetzel grid is but one of several methods which are used in the nutrition clinic to measure the effect of long-continued malnutrition on the growth of children. Serial radiograms of the hand and forearm, photographs in the nude, and cephalometric radiograms are also used.

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were natives of North Alabama and of Anglo-Saxon stock. Of these 108, 54 (the test group) showed definite evidence or history of nutritional deficiency disease. The remaining 54 (the control group) were entirely free from any signs and symptoms suggesting nutritive failure. Both groups were free from acute infectious diseases when this study was begun, and the ratio of males to females was the same in both groups. The investigation extended through 1945 and 1946.

Methods of Study.—All the children were medically examined at the clinic at least four times each year. In many instances more examinations were made, especially during the spring and summer months. None of the children received vitamin, mineral, or supplemental dietary therapy at any time during the two years. A record of all manifestations of nutritive failure and acute infectious disease was kept for each child. The age, height, and weight of each child were recorded at each visit, and these data were plotted on the Wetzel grid.

OBSERVATIONS

The Wetzel grid findings with reference to the age schedules of development for the two groups of children are shown in table I: 35 (65%) of the children free from evidence of nutritive failure were progressing on schedules

TABLE I—AGE SCHEDULES OF DEVELOPMENT (WETZEL) OF 54 CHILDREN WITHOUT NUTRITIVE FAILURE AND 54 CHILDREN WITH NUTRITIVE FAILURE

Type of case	Age schedules of development					
	1–2	2–15	15–67	67–82	82–98	98–100
Control boys ..	1	12	6	7	1	0
Control girls ..	1	6	9	5	6	0
Test boys ..	0	0	7	10	8	2
Test girls ..	0	0	4	10	9	4

Control, children free from evidence of nutritive failure.
Test, children with evidence of nutritive failure.

at or above the 67% auxodrome which Wetzel (1941) regards as the normal. By contrast, only 11 (20%) of the children with nutritive failure were progressing on schedules at or above the 67% auxodrome.

Table II shows the incidence of retarded growth, which is represented on the Wetzel grid by a drift down channel together with an auxodromic slowing down (Wetzel 1945). Of the 54 control children 15 (27%) showed evidence of impeded growth progress; of these, only one instance of retardation occurred in each of 14 children, and two instances occurred in 1 child. In striking contrast to this, 51 (94%) of the 54 test children showed evidence of retarded growth; one instance of retardation occurred in 24 children, two in 23 children, and three in 4 children. No significant differences were observed between the sexes in either group.

Clinical histories revealed that all of the 16 instances of retarded growth in the control children were associated with acute infectious diseases: these included 3 cases of rubella, 2 of abscessed ears, 2 of fevers of undetermined origin, and 1 each of varicella, acute appendicitis, epidemic parotitis, influenza, acute tonsillitis, acute gastritis, acute bronchitis, acute colitis, and septic sore throat. In the 82 instances of retarded growth in the test children, clinical histories revealed that only 4 of them could be attributed to acute infectious disease: 1 abscessed ear, 1 varicella, and 2 fevers of undetermined origin, all of which occurred concomitantly with the periods of retarded growth during the two-year period of study.

The accompanying figure shows the distribution by months of the incidence of retarded growth which

TABLE II—RETARDATION AS DETERMINED FROM WETZEL GRID FINDINGS IN 54 CHILDREN WITH NUTRITIVE FAILURE AND IN 54 CHILDREN WITH NO EVIDENCE OF NUTRITIVE FAILURE DURING A TWO-YEAR PERIOD

Number of retardations	Test group			Control group		
	Boys	Girls	Total	Boys	Girls	Total
0	0	3	3	17	22	39
1	11	13	24	9	5	14
2	13	10	23	1	0	1
3	3	1	4	0	0	0

Growth progress was considered retarded when a drift down channel occurred simultaneously with an auxodromic slowing down on the Wetzel grid.

could not be attributed to acute infectious disease. Retardation of growth was more prevalent in the children with nutritive failure during June, July, and August.

The signs and symptoms suggesting nutritional deficiency diseases and the frequency with which they appeared concomitantly with the periods of retarded growth are summarised in table III. It is important to note that clinical evidence of nutritive failure was observed in every child in the malnourished group in the periods in which growth was retarded. No correlation existed between these periods and the months of birth of the children with nutritive failure. The control children showed no evidence of nutritive failure.

DISCUSSION

The growth of a child is affected by both genetic and environmental influences. Though the children of both groups were of Anglo-Saxon stock, and therefore had a genetic factor in common, the children with evidence of nutritive failure were clearly on much slower age schedules of development than were the control children. The distributions of the age schedules of development of the control children compared favourably with those of Wetzel's (1941) "normal" children. It was significant that, despite the slower age schedules of development and the lower caloric intake theoretically necessary to maintain this schedule, the test children failed repeatedly to keep up to their slower schedule during the two-year

TABLE III—SIGNS AND SYMPTOMS SUGGESTING NUTRITIONAL DEFICIENCY DISEASE OBSERVED CONCOMITANTLY WITH RETARDATION OF GROWTH IN 54 CHILDREN WITH NUTRITIVE FAILURE AND 54 CHILDREN FREE FROM EVIDENCE OF NUTRITIVE FAILURE

Signs and symptoms	No. of test cases	No. of control cases
Sense organs:		
Persistent ocular injection	44	0
Photophobia	11	0
Night-blindness	6	0
Burning and itching of eyes	13	0
Digestive system:		
Slick tongue (atrophy of lingual papillæ)	12	0
Hypertrophied lingual papillæ	17	0
Glossodynia	2	0
Magenta tongue	7	0
Engorged, swollen, slick, hyperæmic gingivæ	15	0
Cheilosis	26	0
Anorexia	6	0
Diarrhœa	4	0
Neuromuscular system:		
Tenderness of calf	3	0
Burning and tingling sensation of extremities	4	0
Irritability, fear, apprehension ..	12	0
Epithelial system:		
Pellagrous dermatitis	4	0
Skin furuncles	4	0
Circulatory system (nutritional anæmia) ..	8	0

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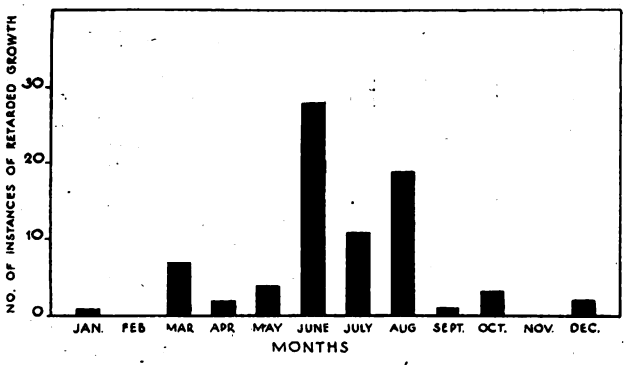
period of study. These findings are in agreement with observations recently reported from France (Stuart 1945), Greece (Valaoras 1946), and Italy (Metcoff and McQueeney 1946) that retarded growth is the most often observed manifestation of undernutrition in European children.

Periods of greatest height gain are offset by periods of least weight gain, and vice versa (Reynolds and Sontag 1944). Palmer and Ciocco (1945) state :

> " In the northern and southern hemispheres all reported observations indicate that growth in weight proceeds at maximal rates during the late summer and autumn, continues at considerably reduced rates during the winter, and falls to minimal rates in the spring and early summer. The seasonal differences appear to be more marked in older than in younger children, but are striking for children of all ages. . . . While increases in weight are greatest in fall and least in spring, the opposite is true of increases in height, which are greatest in spring. . . . There appears to be no significant sex difference in these variations."



Monthly distribution of incidence of retarded growth associated with nutritive failure in 54 malnourished children. Note tendency of periods of retarded growth to occur most often in June, July, and August.

The tendency of the children with nutritive failure (the test group) to show retardation of growth most often in June, July, and August, the periods in which signs and symptoms suggesting nutritive failure are most prominent, is therefore especially significant.

SUMMARY

The growth of 54 children with nutritive failure was compared with that of 54 children who gave no evidence of nutritive failure. Height-weight data, analysed by use of the Wetzel grid, were used to evaluate growth.

The 54 children with nutritive failure had a slower and more erratic growth pattern than did the 54 children free from evidence of nutritive failure.

The incidence of retarded growth in malnourished children was greatest in June, July, and August.

Clinical evidence suggesting nutritive failure was observed in every instance of retarded growth in the malnourished children (test group).

Infectious disease coincided with every instance of retarded growth in the children free from evidence of nutritive failure (control group).

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FAILURE OF SULPHONAMIDES AND PENICILLIN IN MADUROMYCOSIS

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LITTLE attention has so far been paid to the effect of sulphonamides or penicillin on deep mycoses of the skin.

As regards actinomycosis, successful experiments with sulphonamides in animals have been reported by Dósa (1941), and occasional cures with sulphonamides in man have been described by Hollenbeck and Turnoff (1943), Billington (1944), Lyons et al. (1943), and Benbow et al. (1944). As regards other deep mycoses, in-vitro experiments (Keeney et al. 1944) showed the possibility of affecting *Phialophora pedrosi* with sulphamerazine, and *Histoplasma capsulatum* with sulphathiazole.

Keeney et al. (1944) report destruction of cultures of *Actinomyces bovis* by penicillin in a concentration of 0·01 unit per ml. of culture medium. A penicillin effect on ten strains of actinomyces was reported by Selbie et al. (1945), though the sensitivity was weaker than that recorded for the Oxford strain of *Staph. aureus*. Genuine cure of actinomycosis with penicillin in doses of $1^1/_2$ to 2 million units was referred to by Hendrickson and Lehman (1945), Herrel (1945), Jones and Brownell (1945), and Walker and Hamilton (1945).

No reference to experiments on the effect of penicillin in maduromycoses is given by Fienberg (1944) or by Burns et al. (1945). Peters (1945) used penicillin in doses of 1,050,000 units intramuscularly in one case of actinomycotic Madura foot, apparently without result, whereas sulphadiazine later effected cure. The case described below[1] is of interest because we could watch the effect of penicillin and of sulphonamide in a hospital case of maduromycosis for an extensive period.

CASE-RECORD

A male native of Aden, aged 40, was admitted to hospital in 1941 with a history that $5^1/_2$ years earlier he had noted a small painful swelling in the sole of his left foot which inconvenienced him in his work as an agricultural labourer.

On examination the entire sole of the left foot was swollen, bluish-red, and dotted with circumscribed elevations, from seventeen of which a yellowish fluid could be expressed, mixed with black granules 1–3 mm. in diameter (fig. 1).

Laboratory Findings.—Urine, fæces, and blood normal. Wassermann and Kahn reactions negative. Microscopical examination of the granules, after treatment with potassium hydroxide for a few days, showed a closely set mycelium. On Sabouraud-maltose-agar and on broth and agar-agar colonies developed of the madurella type, similar to *Madurella americana*—i.e., coarse ramified filaments with well-

1. For fuller details see Dostrovsky and Sagher (1942).

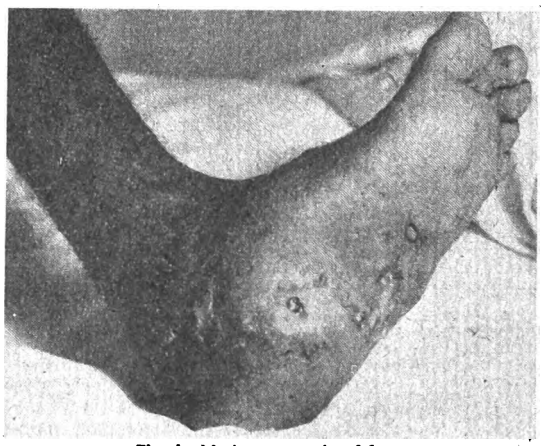

Fig. 1—Maduromycosis of foot.

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defined cell membranes and chlamydospores. The intracutaneous trichophytin test was negative, and so was the intracutaneous test with material prepared from cultures of the lesion.

Therapy included potassium iodide, sulphapyridine (total dosage 72 g.), and injections of 1% brilliant-green into the tumours. Though much improvement was noted and the patient could walk, the lesions did not heal. The patient left hospital and did not report again until $3^1/_2$ years later.

On readmission on May 31, 1945, the condition had become worse. For some time after his discharge the patient had been able to work, but later he could not walk. The sole of the foot and the malleoli were dotted with fistulæ from which masses of black granules could be expressed. Laboratory findings were the same as on the first occasion, and cultures were again positive. The trichophytin test was still negative. Radiography, which previously had shown no abnormality, now showed extensive involvement of the calcaneus with cavities and sclerosis. This was later well shown on section of the amputated foot (fig. 2).

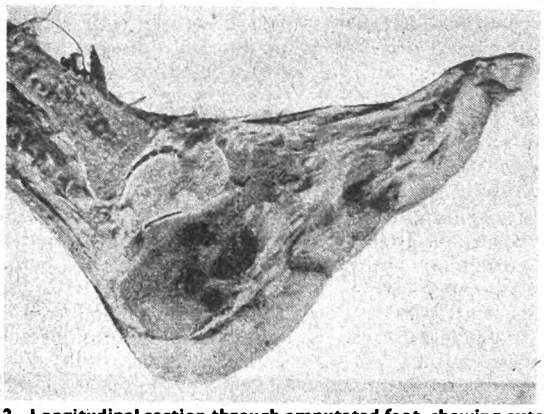

Fig. 2—Longitudinal section through amputated foot, showing extent of bone lesion.

Therapy included sulphadiazine (total dosage 100 g.), X rays in doses of 150r to a total dosage of 1050r medial and 900r on the lateral field. Radiation factors: 40 cm. focus-skin distance, 4 mA, 190 kV, 0·5 mm. Cu + 1 mm. Al. Since no effect was noted, intramuscular injections of sodium penicillin 10,000–15,000 units were given every three or four hours to a daily total of 90,000 units. Further injections of 10,000 units were given locally into the tumour. The total amount of penicillin given in fifty days was 5,000,000 units.

Results.—An undeniable effect on the secondary infection was noted, but the mycetoma itself did not respond to this treatment. Six weeks later, therefore, the foot was amputated by Professor Mandl.

COMMENT

The ineffectiveness of penicillin in this case may be explained by (1) insensitivity of the fungus to penicillin; (2) insufficient dosage; or (3) inadequate contact between the penicillin and the fungus, because of the depth in the bone to which the mycetoma had penetrated.

It was impossible to determine the sensitivity of the fungus to penicillin by in-vitro experiments owing to the difficulty of making cultures and the fact that the organisms did not survive the third subculture.

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Medical Societies

ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE

Treatment of Leprosy

AT a meeting on Jan. 15, with Sir PHILIP MANSON-BAHR, the president, in the chair, a symposium was given on the treatment of leprosy. Dr. ERNEST MUIR pointed out that in this disease there is often much spontaneous clinical improvement, which must not be ascribed to the use of a speculative drug. Hydnocarpus oil, he said, has long been used, but he doubted if it has any special effect apart from its counter-irritant action; his results with this drug were better in India than in Trinidad.

There is a consensus of opinion that the sulphone series of drugs are beneficial in leprosy. 'Promin' has been tried in the United States; given by mouth it proved unduly toxic, and so it was given intravenously. Sometimes advanced disease was arrested by it in about five years. In Trinidad Muir used 'Diasone' in 1944. This drug is well tolerated by mouth and the immediate results are good. Early in treatment acute anæmia may develop; this is corrected by temporarily stopping the drug and giving iron and liver preparations. In advanced cases the results of diasone treatment appear in three stages: (1) in a few weeks or months cutaneous ulcers heal, the nose becomes clear, and the acute progressive condition of the eyes is arrested; (2) in a few months to a couple of years febrile reaction and the transient nodules gradually disappear, and larger nodules diminish in size; and (3) in two to five years bacilli become noticeably less. In Brazil 400 cases have been treated with promin or with diasone; diasone gave a quicker result. Two new sulphone derivatives, 'Promizole' and 'Sulphetrone,' are now on the market; these are less toxic and give quicker results than the earlier products.

Anæmia and reactive exacerbation (lepra reaction) may be increased by sulphone treatment. It is best to start with 0·3 g. of diasone, or 0·5 g. of sulphetrone, every second day; after a week the dose is doubled; it is then increased until within some weeks or months 1 g. of diasone, or 2 g. of sulphetrone, is given on alternate days. Daily dosage is gradually introduced, 1 g. of diasone being increased to 2 g., and 2 g. of sulphetrone to 3 g., daily. The blood should be examined often, and if the hæmoglobin falls below 70% treatment is temporarily stopped, and iron and liver is given. Febrile reaction and/or the appearance of inflammatory nodes call for temporary suspension of treatment or smaller dosage. Treatment by mouth, though it has many advantages over injection treatment, is attended by the dangers of self-medication, or the sale of tablets by patients who do not take them.

There is some evidence that as bacilli vanish the patient becomes resistant to leprosy. Dr. T. F. Davey, of the Nigeria Leper Settlement, found that in 11 out of 17 lepromatous cases treated with sulphetrone for 5–10 months the lepromin test became positive. There is no evidence that sulphone-resistance develops in leprosy. It is not known if sulphone treatment cures the disease, but in a few years bacilli largely disappear and the patients become non-infective to others; thus the sulphones are of value in control.

Dr. E. W. O'G. KIRWAN gave an account of eye complications. Leprosy, he said, is one of the great causes of blindness; and the incidence of eye complications ranges in various parts of the world from 5% to 100% of those afflicted with the disease. Treatment is disappointing, except in early cases; but even in grave cases much can be done to delay blindness. Dr. Kirwan underlined the importance of a knowledge of ophthalmology by those treating leprosy; he regards as indispensable a slit-lamp, with a corneal microscope and an ophthalmoscope.

Dr. A. R. D. ADAMS gave an account of the treatment with diasone and 'Promanide' of 3 Europeans suffering

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from actively progressive lepromatous leprosy in this country. He has experienced no gross toxic manifestations with the drug, and the objective improvement in all these cases was remarkable. Nevertheless, the number of bacilli did not diminish during the period of observation despite the diminution and apparent disappearance of the lesions. Blood-levels in 2 patients taking 0·9 g. of diasone daily ranged from 1 mg. per 100 ml. to 2·2 mg. per 100 ml., calculated as diasone.

Dr. Adams directed attention to the lamentable lack of amenities for persons suffering from leprosy in this country. Apart from the St. Giles Homes, no hospital will willingly or knowingly admit a case of leprosy for treatment of the primary condition, or for a concurrent condition. Local authorities to which cases have been notified have forcibly incarcerated the patients, whether or not this is necessary, without the benefit of expert supervision or treatment. This has on occasions led to suicide or death from despair, and it is not surprising that concealment is practised by patient and by doctor. It is high time, said Dr. Adams, that a more humane and enlightened attitude prevailed in this country; patients requiring hospital treatment should be sure of admission and of properly skilled attention.

The PRESIDENT heartily agreed that resources for dealing with cases of leprosy in this country are grossly inadequate. In the past there was limited accommodation at the Seamen's Hospitals, but this is no longer available; the problem is an acute one.

Sir WILLIAM MACARTHUR gave an account of leprosy gleaned from writings of the past. The word "lepra" originally meant "scaliness"; but it also had other meanings and was applied in the sense of an affliction. The importance of leprosy has been greatly exaggerated by ecclesiastical influence, and the disease has become an obsession and the object of a crusade. It is only within the last ninety years that pictures of lazar houses, lepers' windows in churches, and so forth have appeared in print.

Dr. W. E. COOKE confirmed the encouraging results obtained with diasone. Some patients have been able to leave the St. Giles Homes after $2^1/_2$ years' treatment, and are now under domiciliary treatment. The accommodation at these homes is insufficient; they were intended as a refuge, not as a hospital. He, also, emphasised the need for the provision of proper amenities in this country.

Mr. GEORGE BROWNLEE, PH.D., said sulphetrone produces three types of anæmia: hypochromic, nutritional, and hæmolytic. The hæmolytic anæmia, which is always present, is due to increased red-cell fragility and tends to stabilise itself; it is not associated with changes in the white cells. In tuberculosis larger doses of the sulphones have been used than are advocated in leprosy. It may be desirable to increase the dosage in leprosy; it is undesirable to give suboptimal doses, for it is known that the tubercle bacillus develops some resistance to these drugs within nine months.

Dr. C. C. CHESTERMAN said he had seen Dr. Davey's cases in Nigeria, and he had also seen the Carville cases. The results are very encouraging, and the use of the drug will lessen the need for segregation. He, like previous speakers, considered resources for the treatment of leprosy in the United Kingdom inadequate.

Dr. W. H. GRAY said that not all sulphones are derivatives of diaminodiphenylsulphone. This was prepared in the same year as sulphanilamide, and against streptococci and pneumococci in mice it has been found more effective; but since it is sparingly soluble and toxic, it was abandoned. Sulphetrone was prepared in 1927, but its action on tuberculosis and leprosy was not discovered until lately.

Dr. MUIR agreed that amenities for the treatment of leprosy in this country are grossly deficient; this, he said, has been accentuated in the last year or so by the introduction of a greatly increased number of cases from India and the Far East, and the position is likely soon to become pressing.

LIVERPOOL MEDICAL INSTITUTION

Myasthenia Gravis

AT a meeting on Jan. 8, with Dr. H. WALLACE-JONES, the president, in the chair, there was a symposium on myasthenia gravis.

Dr. H. S. PEMBERTON stated the grounds for believing that the altered transmission at the neuromuscular junction was due to a changed cholinesterase-acetylcholine balance, which in turn led to a curare-like block. This defect was temporarily removed by 'Prostigmin,' eserine, and ephedrine, and for a much longer period—if not permanently—by thymectomy, whether the thymus were histologically normal or abnormal. He assumed that thymic activity was directly or indirectly related to this block phenomenon.

Mr. HUGH REID discussed the history of surgical intervention in this condition. The first thymectomy was performed by Sauerbruch; Blalock reported twenty operations in 1942; and more recently Keynes described a series of a hundred cases. In these the results were satisfactory and sometimes curative.

Dr. R. D. HOTSTON described seven cases of myasthenia gravis; in five the thymus had been removed, and one of these patients, with a very large malignant thymoma, had died on the second postoperative day. The other four had survived the operation for periods of 1 to $2^1/_2$ years; three were undoubted successes, and one, who had been free from symptoms and off all treatment for 2 years, had recently relapsed. After thymectomy it might be possible to withdraw prostigmin immediately, or it might have to be withdrawn gradually.

Dr. WINSTON EVANS said that histological examination of thymus glands removed from five cases of myasthenia gravis showed a slowing-down of the age involution process, and an irregular infiltration of the medulla by lymphocytes. Hassall's corpuscles were present in each gland. In the medullary portion of all these glands actively dividing reticulum cells were present. These were arranged in a focal and circumscribed manner, resembling the Flemming centres seen in reactive follicular hyperplasia of lymph-glands and of intestinal lymphoid tissue; their pale centres showed many mitotic figures. These follicle-like structures were not found in specimens of thymus gland derived from patients without myasthenia gravis. From America there were reports of lymph follicles in the thymus glands of patients with myasthenia gravis and also with Addison's disease, acromegaly, and hyperthyroidism.

Mr. R. MARCUS pointed to the difficulty of diagnosing thymomas before death and biopsy. The clinical symptoms were few at first and not pathognomonic; and not until lymph-nodes became involved and symptoms of intrathoracic pressure developed was neoplasm suspected. Surgical removal of encapsulated tumours was the only sure method of cure; but radiotherapy often caused temporary regression or disappearance. The effects of high-voltage therapy were shown in three cases. In two there was complete disappearance of the tumour and relief of symptoms 18 and 15 months after exposure to 4500r through four portals of entry over a period of 28 days; in the third case the tumour recurred 3 months after exposure to 3750r. The diagnosis was confirmed by biopsy in two of the cases.

Prof. HENRY COHEN doubted if thymectomy was the answer to the therapeutic problem presented by myasthenia gravis. Why did many patients fail to improve after operation though their condition was apparently similar to that in those who benefited? Improvement after thymectomy was almost always slow and was commonly incomplete—in contrast to the rapid change after surgical intervention in endocrine disorders. There were different types of myasthenia gravis. Hyperthymism might have myasthenia gravis as one of its manifestations, but myasthenia gravis did not always imply hyperthymism.

Dr. T. CECIL GRAY emphasised that, in operating on patients with myasthenia, anæsthesia should be light; very little anæsthetic was required in these cases.

Dr. R. C. NAIRN said the "specific" histological appearances of the thymus described by Dr. Winston

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Evans and others in myasthenia gravis and other conditions such as Addison's disease and thyrotoxicosis should not be regarded as anything other than non-specific lymphatic hyperplasia in the gland; it might be associated with a similar hyperplasia elsewhere in the body, and might arise in a wide variety of conditions.

Reviews of Books

Social Health and Morals

I. FRASER MACKENZIE, M.D., D.P.H. London: Gollancz. 1947. Pp. 173. 7s. 6d.

USING the word "morals" to signify "the conduct of personal relations between the sexes," Dr. Mackenzie discusses the social malaise which has its roots in sexual maladjustment, and the mental and physical disease arising from it, and suggests ways of tackling the problem. First, standards of conduct must be re-emphasised; secondly, the community must be persuaded to respect the need for earlier marriage which so many (it is contended) feel but are unable to realise. Sex, as a subject, interests most strongly young people in their adolescent and post-adolescent stages, when the mind is highly impressionable. Moral standards during this period do not arise, as it were, autochthonously, and uncertainty about standards of conduct may lead to frustration or cynicism, and neither mood favours social health. Dr. Mackenzie's book should be useful particularly to medical students and those recently qualified. It would be a pity, too, if his injudicious mixture of popular style and medical jargon, in the earlier pages, were to scare away the intelligent layman.

The Blood Pressure and its Disorders Including Angina Pectoris

(2nd ed.) JOHN PLESCH, M.D., L.R.C.P.E., formerly professor of internal medicine in the University of Berlin. London: Baillière. 1947. Pp. 307. 21s.

THIS is a book about arterial pressure, venous pressure, and angina pectoris, of which each is used as a vehicle for the author's ideas. These are often original and sometimes stimulating, but many are based on physiological concepts somewhat at variance with present-day thought. There is an appendix on methods, but no convincing evidence that they are better than those in current use. The tonoscillograph is described and its employment advocated.

Elsevier's Encyclopædia of Organic Chemistry

Editors: E. JOSEPHY, F. RADT. Series III, Carboisocyclic Condensed Compounds. Amsterdam, London, and New York: Elsevier Publishing Company. Vol. 13, Tricyclic Compounds. 1946. Pp. 1265. £19 7s. Vol. 14, Tetracyclic and Higher Cyclic Compounds. 1940. Pp. 711. £11 4s. (for subscribers to the whole work).

THESE two volumes reached England in 1947. They represent the beginning of a massive work, in English, which is expected to consist of some 20 volumes in about 40 separate parts. It is intended as a "complete survey of all organic compounds including not only purely chemical but also physical and physiological data." In a production of this type the systematic arrangement of the compounds is of great importance; the system chosen—based on the carbon skeleton—should make the whole work easy to consult.

The first volume to appear, no. 14, deals with condensed-ring carbocyclic compounds containing four or more rings, and bears the date 1940. It covers the literature up to 1936, but gives some additional references up to 1939. Substances of biological importance mentioned in it include the sterols, sex hormones, cortical hormones, bile acids, and the cardiac toad poisons. Volume 13, the second published and dated 1946, deals with condensed-ring carbocyclic compounds with three rings, and therefore contains rather less matter of biological interest. Production is of a high order, the printing of the text and formulæ being excellent. Noteworthy features are the tables of physical properties, the reaction schemes, and the indices at the beginning of important sections; in addition there are main subject and formula indices, and it is difficult to see what more could be done to facilitate the use of the work. Volume 14 was being prepared during the time when Holland was being overrun, and its achievement is therefore the more remarkable. Supplements will be published about ten years after the appearance of the original volumes.

Sigmund Freud—an Introduction

WALTER HOLLITSCHER, D.PHIL. London: Kegan Paul, Trench, Trubner. 1947. Pp. 119. 8s. 6d.

Dr. Hollitscher is at his best when arguing a logical point. Thus in demarcating the legitimate functions of the psychologist and the sociologist he makes a needed criticism. The psychologist, he points out, after detecting an unconscious motive (and such detection is his function), will go on to value the action in terms of the motive—a most biased proceeding. The non-sequitur reads: the banker reveals a Freudian anal-sadistic character; therefore banking is merely the expression of the anal-sadistic motive. The author belabours this point of view soundly, tracing it up to its philosophic counterpart: rationalisation is inherent in man's mental mechanics; therefore all philosophic (rational) conclusions are invalid because all are tainted with rationalisation. Dr. Hollitscher holds that even though they are so tainted, they may still be valid. This much is sound; but it is all in the last chapter.

The rest of the book is not an introduction to Freud but a brief outline of the main mental mechanisms in Freud's conception of psychodynamics. The author's admirable purpose is to bring psychology to the sociologists; but, as he argues very briefly, for him psychology is Freudianism, and this he proceeds to offer them (in outline). Unfortunately there is not room in so slim a volume for both statement of doctrine and argument in its favour. Statement therefore partly replaces argument, and the critical reader feels harassed by the number of controversial issues raised but inadequately settled.

The Electron Microscope

V. E. COSSLETT, PH.D., M.SC., F.INST.P. London: Sigma Books. 1947. Pp. 128. 7s. 6d.

THE author makes it plain that the electron microscope has been constructed on the lines of the ordinary microscope, despite the greater technical difficulties which enter into its assembly and attend its proper functioning. Those who use it face real problems in examining specimens, but results have already justified the ingenuity spent on this invention, as well as its cost. On the medical side, fresh light has been thrown on the structure of bacteria, blood-cells, and viruses; ordinary optical means could never have given equal results—as the set of 12 illustrations clearly demonstrates.

Énergamétrie

GABRIEL BIDOU, chef du centre de récupération fonctionnelle des Hôpitaux de Paris. Paris: Maloine. 1947. Pp. 104. Fr. 250.

THIS describes an apparatus which measures the extent of movement at joints. It also purports to measure the available power of muscle groups and to compare this with the normal. The nominal units of work are kilogramme-metres, but their authenticity is highly questionable. The energy "measurements" may have a comparative value, and thus be useful for putting a figure on deficiency, compensation, and reablement. The only references are to legal works.

A Textbook of Gynæcology (7th ed. London: A. & C. Black. 1947. Pp. 459. 30s.).—For many years now Prof. James Young's book has been a sort of gospel of orthodox gynæcology. Among its best features are the sections on endocrinology, which will guide not only the beginner but the more advanced postgraduate. The symptom of backache is carefully evaluated, and the author does much to correct the old notion that backache, as a presenting symptom, incriminates the pelvic organs before anything else—a belief which has been responsible, in the past, for much unnecessary, and therefore bad, gynæcological treatment. The ovarian tumours are very well described, but the book is sadly deficient on the subject of abortion, surely one of the commonest and most important accidents that can befall a woman during reproductive life.

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THE LANCET

LONDON: SATURDAY, JAN. 31, 1948

War or Peace

THE vote now to be taken will have far-reaching consequences, not only for the medical profession but also for other people. Before voting every doctor ought to consider what those consequences may be. And this cannot be done without looking into the political arena.

Unlike most prime ministers, Mr. ATTLEE has put at the Ministry of Health one of the principal members of his Cabinet—a man strong in courage, in opinion, and in dialectic, and a master of his brief. It happens that Mr. BEVAN is also a leader of the left-wing Socialists. Nevertheless his approach to the National Health Service problem inherited from his predecessors was practical rather than doctrinaire, and he persuaded his party to acquiesce in several important deviations from its declared policy—notably in entrusting the hospitals to non-elected boards and committees, in allowing all doctors within the service to continue private practice (with the private use of hospital beds), and in reducing the salary component in practitioners' remuneration so as to fulfil the Spens Committee's recommendation that their range of income should be wide. Having in this and other ways yielded to professional opinion against the declared principles of his party, he succeeded in steering his compromise Bill through Parliament under fire from both sides, and then announced his readiness to discuss the regulations with those concerned. He found, however, that the representatives of the profession did not accept Parliament's decisions as final and sought amendment of the Act. Negotiations were resumed on the uneasy basis that amendment was still a possibility; but obviously it was going to be hard to persuade the Minister that such amendment must precede trial of his Act in operation. In retrospect it is clear that he made a psychological mistake in entering on negotiations unless he intended to make concessions of some kind at the end of them. Perhaps he did so intend; but at some unknown point in his relations with the Negotiating Committee he seems to have come to the conclusion that it was aiming not at agreement but at tactical advantage. The British Medical Association, though it approved the conception of a comprehensive medical service, had objected to the schemes brought forward by one Government after another, and Mr. BEVAN began to think that organised medicine would never do anything else: in no country, he reflected, has a medical service been established except in the teeth of the doctors. The line taken by the Negotiating Committee brought to the surface his underlying prejudice against a privileged profession; and, though his written words have been always correct and often conciliatory, he has lately given the impression of a man whose patience was almost exhausted, and who might enjoy victory more than agreement. All this has enabled his opponents to display him convincingly as the very type of Minister to whom power over a medical service must on no account be yielded, and it is a plain if deplorable fact that a proportion of the profession are now objecting to the service chiefly because they object to Mr. BEVAN.

The result of the plebiscite depends on what may be called the floating vote; and the attitude of many moderate men may be summarised thus: "The National Health Service has got to come, and the proposals now made are in some ways better than might have been anticipated. But Mr. BEVAN has shown himself arbitrary and obstinate, and we have no guarantee that, once we are inside, he or his successors will not change the regulations so that we shall have a regimented whole-time salaried service which will debase the whole practice of medicine. Before we come in, the Act ought to be modified so as to make this impossible. And by voting solidly together we might force the Government to modify it." Those who say this, however, should be clear in their minds as to whether they expect the vote itself to effect their purpose or whether they are relying on united action later. If we judge the Minister aright, an adverse vote would stiffen rather than relax his attitude. It seems, indeed, unlikely that any Minister—let alone Mr. BEVAN, who has always thrived on combat—would regard appeasement as the right response to a hostile demonstration; and it would take more than courage to face the present House of Commons with an amending Bill which appeared to be dictated by the B.M.A. At a time when the recovery of the country depends on inducing trade unions, industries, shareholders, and workpeople to sacrifice their individual interests to those of the nation, we may be sure that the Government would not readily surrender in any way to what they would regard as a deliberate attempt, for partly political reasons, to thwart the will of Parliament. Their probable reaction would be to assert that organised medicine was once more standing in the way of a useful public service; instead of writing about "Doctors *v.* Bevan" many newspapers would soon be writing of "Doctors *v.* the People"; and any subsequent defects apparent in the National Health Service might be attributed to the unwillingness of the profession to work it properly. The Government's position is clear to everyone: an Order in Council this week states that the service approved by Parliament will come into being on July 5. The B.M.A.'s alternative seems relatively nebulous: we are to return to the practice conditions of 1910 and hope that these will prove so inconvenient that within a few months the Government will have to change their scheme—to an extent not yet defined.

All this need not mean that members of the profession are not entitled to express their opinion, regardless of the consequences. But those who for one reason or another decide on active resistance should recognise that success will depend not on bluff but on force; and there may have to be enough force to bring down a powerful Minister and shake a Government. The B.M.A. reckons that with 13,000 practi-

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tioners dissenting the service could not be introduced; and it may be right. On the other hand, nobody questions the power of a minority, if sufficiently large, to bring their colleagues, willy nilly, into the service; and it is a tragedy for the profession that this has become a possible if not a probable outcome. The tragedy is one for which the B.M.A unwittingly bears a share of responsibility. Its proper function, we believe, was to develop a common policy which almost every doctor could accept, and to present that moderate policy to the Governments in a spirit of coöperation. But unhappily its constitution does little to promote adequate expression of minority opinion in the representative body, and still less to give such opinion spokesmen in the council itself. Though this may have induced a satisfying sense of unity in the council-chamber, it has also led to the formulation and vigorous recommendation of a policy much less constructive than a great body of the profession would, if so advised, have been well content to accept and apply. Had more shades of opinion been reflected in its counsels, the B.M.A.'s policy would have been more helpful and more practicable, and it would have averted a situation in which many doctors feel that loyalty to the official views of the profession is incompatible with loyalty to the public. Minorities exist; and, though it is utterly wrong that they should be in a position to force their will on others, the fact must be faced that if the vote enables the association to declare war on the Government one of the consequences will be an open split in the profession which must damage it, and the service, for many years. In this long-drawn controversy the attitude of each side has been almost enough to justify the intransigence of the other; but if by their reciprocal failures in statesmanship the Minister and the B.M.A. combine to divide doctors into two distinct and clearly branded groups—the just and the unjust—no purity of motive will excuse the crime.

For the voter the plebiscite is extraordinarily difficult, both because of the form of the questions and because of their timing. In making his decision he must either reject or accept the whole of the National Health Service Act arrangements; and while he may hesitate to reject them he will be disinclined to commit himself to accepting terms of service which have not yet been made clear and which ought still to be modifiable by criticism or protest. Take for example the important question of remuneration: no terms for consultants have yet been issued, and the Negotiating Committee never even got to the stage of discussing whether the Minister's proposals for practitioners do in fact fulfil the Spens Committee's recommendations. Mr. BEVAN, in stating that they are meant to do so, admits that they are not yet complete; and though it would be rash to hope for much increase on what is now offered, since this is probably the maximum that the Treasury, in difficult times, is prepared to spend, it is unfair that the doctor should be asked to say yes or no before he knows exactly where he stands. In these complex circumstances what is he to do? We can only answer that he must vote on the major issue—the vital and overriding issue—namely, war or peace.

Regretting equally the belligerence of the Minister and of the association, we last week presented the Act as we see it. We showed that by far the larger part has been virtually agreed, and that on each of the points still in dispute—in particular the appeal to the courts—Mr. BEVAN produces sensible if not conclusive arguments. To our suggestion that the basic salary, or "fixed annual payment," should be optional, and that a sliding capitation fee should be offered to practitioners who prefer it, he has replied that no convincing case has yet been put forward. This implies that the possibility is not yet excluded; and the changed atmosphere that would succeed a consenting vote in the plebiscite would permit discussion of this and kindred subjects, almost for the first time, on their merits instead of as items of an ultimatum—discussion between associates rather than opponents. What, if anything, such discussion would yield we do not pretend to predict; but Mr. BEVAN knows as well as other people that the duty laid on him by Parliament is to introduce this service as smoothly and efficiently as possible, and it would be a mistake to impede his return to that duty. Like all great undertakings, the new service has its perils, but they have been disproportionately emphasised. Without graver cause than its present pessimistic fears the profession would be wrong to engage in a major political struggle. Its strength lies elsewhere, and its true interest, like that of the people, is in peace.

Tissue Forms of the Malaria Parasite

A DISCOVERY of great importance for human malaria has been made at the London School of Hygiene and Tropical Medicine, where Prof. H. E. SHORTT and Dr. P. C. C. GARNHAM [1] have found developmental stages of malaria parasites in the liver of a monkey inoculated seven days earlier with mosquitoes carrying *Plasmodium cynomolgi*. These parasites are the long-sought tissue forms of malaria, which have been confidently postulated for many years but had not previously been seen in spite of intensive search. To understand their significance it is necessary to go back to the early history of malaria research at the beginning of the present century.

The stories of LAVERAN's discovery of the malaria parasite and of Ross's description of its passage through mosquitoes are well known. The mosquito cycle ends in the production of sporozoites which pass with the insect's saliva into the man or bird whom the mosquito bites. In 1902 SCHAUDINN [2] watched sporozoites (of *P. vivax*) penetrate red cells, in which they then developed according to the cycle described by LAVERAN. This seemed to complete our knowledge of the life-history of the malaria parasite; SCHAUDINN's illustrations were reproduced in the standard textbooks of tropical medicine and protozoology, and there the subject rested for thirty years. But gradually malariologists began to realise that something was wrong somewhere, and S. P. JAMES and others demanded a complete revision of the current conceptions of this part of the malaria parasite's life.

In the first place, no-one had ever been able to repeat SCHAUDINN's observation. Secondly, in 1924, YORKE and MACFIE [3] described some curious observa-

1. *Nature, Lond.* Jan. 24, 1948, p. 126.
2. Schaudinn, F. *Arb. Gesundhamt, Berl.* 1902, 19, 169.
3. Yorke, W., Macfie, J. W. S. *Trans. R. Soc. trop. Med. Hyg.* 1924, 18, 1.

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tions on the protective action of quinine during the malaria therapy of general paresis. If a patient was inoculated with blood containing malaria parasites, and quinine was used to treat his subsequent infection, he was easily and permanently cured; if quinine was given during the incubation period the infection was completely prevented. But if a patient was inoculated with sporozoites, quinine given during the incubation period completely failed to prevent the attack of malaria; and quinine given at a later stage produced only a temporary freedom from symptoms followed by a relapse. Clearly, infections produced by sporozoites differed fundamentally from those produced by injecting infected red blood corpuscles. This difference was further shown by the incubation (prepatent) periods in the two cases. If large numbers of infected corpuscles were injected intravenously the incubation period was very short or absent, and the blood was always infective for other subjects. If sporozoites were injected, in no matter how great numbers, the incubation period was never less than five to six days (*P. falciparum*) or eight days (*P. vivax*), and during this period the blood was not infective for other subjects. To explain these phenomena, JAMES postulated that the sporozoites passed not into the blood corpuscles but into the tissues, and that they underwent some special developmental cycle before reappearing as the familiar trophozoites and schizonts in the erythrocyte. This conception received strong support in 1936–37 when it was shown by RAFFAELE,[4] KIKUTH and MUDROW,[5] and JAMES and TATE [6] that in many bird malarias large exoerythrocytic forms actually did occur. In 1943 and 1944 REICHENOW and MUDROW [7] and HUFF and COULSTON [8] independently showed that in bird malaria sporozoites (injected by mosquito or by syringe) enter the macrophages of the skin, spleen, &c., and pass through 3–4 generations as exoerythrocytic forms before the corpuscles become infected. Since malaria in birds is closely analogous in many ways to malaria in man and monkeys it seemed a simple matter to apply HUFF's technique to the latter infections and to demonstrate the same forms in man and monkeys; and groups of workers in America, Britain, and India set themselves confidently to the task. Unexpectedly, the demonstration proved exceedingly difficult, and the methods which had been so successful with chicken malaria yielded no results with the human or simian infection. The American Society of Parasitologists [9] discussed the subject for a whole session on Dec. 31, 1947, but all speakers confessed their failure to discover the tissue forms which everyone was convinced really existed. Until last week the only tissue forms which had been found in mammals were of a malaria parasite of bats [10] and in the liver of monkeys infected with *P. kochi*.[11] But these parasites were more like hæmoproteus than like the plasmodia of human malaria; so their discovery did little to mitigate the sense of frustration arising from the general conviction that tissue forms of malaria existed and the general failure to locate or identify them.

SHORTT and GARNHAM worked with *P. cynomolgi*, a malaria parasite of monkeys closely resembling *P. vivax* of human benign tertian malaria. Very large numbers of infected mosquitoes were ground up and injected into a monkey, which was killed for examination seven days later. On examination of the liver by the usual histological methods they found numerous large parasites, measuring 25–30 μ in their largest diameter, which resembled in their staining reactions the tissue forms of bird malaria. Similar parasites were found in the liver of a second monkey which had been sacrificed on the sixth day of the incubation period. It is understood that this finding has since been confirmed by other workers (after demonstration by Professor SHORTT), and that similar parasites have been found in sections made from the livers of three monkeys, killed 5 days, 7 days, and 8 days after the injection of sporozoites. In view of the large size of the parasites it is surprising that their discovery has hitherto baffled so many able parasitologists for three years, but the explanation may lie precisely in their largeness; the mental outlook which expects something small, and the techniques adapted for seeking it, easily lead to larger objects being overlooked or not recognised. Moreover, the demonstration by HUFF and COULSTON—that sporozoites of chicken malaria developed in macrophages of the skin—was so striking and their technique so ingenious that many seekers may have been blinded to other possible modes of development and to simpler but (as is now proved) more appropriate techniques. SHORTT and GARNHAM are to be congratulated on their clear-sightedness which has rescued malariologists from this deceitful maze of false clues.

Plasmodium cynomolgi of monkeys is so similar to human malaria parasites that it is practically certain that the latter follow the same developmental cycle (though there may be minor differences in size, location, and duration). From this discovery and from previous work on human malaria (especially that of FAIRLEY and associates [12] in Australia during the late war) it is possible to predict the development of human malaria parasites with considerable confidence. The sporozoite injected by the mosquito is carried by the blood to the liver, where it enters hepatic parenchymatous cells. There it develops for 5–6 days (*P. falciparum*) or for 8 days (*P. vivax*), in the form described by SHORTT and GARNHAM. It is not yet known whether several generations are represented by this period, or only a single one. Then merozoites are liberated which invade the erythrocytes to develop as the well-known malaria parasites of the blood. In the case of *P. falciparum*, the tissue forms probably die out soon after the infection has developed in the blood corpuscles. In the case of *P. vivax* they probably persist for 1–3 years, giving rise at intervals to the relapses typical of benign tertian malaria. The tissue forms of the quartan parasites probably persist for over 20 years. Further observations will be required before this hypothetical description can be accepted as proven fact; but SHORTT and GARNHAM have clearly shown what is to be expected, and in the light of their discovery verification should be easy.

4. Raffaele, G. *Riv. Malariol.* 1936, **15**, 318.
5. Kikuth, W., Mudrow, L. *Klin. Wschr.* 1937, **16**, 1690.
6. James, S. P., Tate, P. *Nature, Lond.* 1937, **139**, 545.
7. Reichenow, E., Mudrow, L. *Disch. tropenmed. Z.* 1943, **47**, 289.
8. Huff, C., Coulston, F. *J. infect. Dis.* 1944, **75**, 231.
9. *J. Parasit.* 1947, **33**, suppl. p. 27.
10. Mer, G. G., Goldblum, N. *Nature, Lond.* 1947, **159**, 444.
11. Garnham, P. C. C. *Trans. R. Soc. trop. Med. Hyg.* 1947, **40**, 719.
12. Fairley, N. H., et al. *Ibid*, 1945, **38**, 311.

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Annotations

PSYCHIATRIST AND MAGISTRATE

THOUGH we are now all convinced that the delinquent and the young offender should be reformed and not merely punished, ways and means of achieving the good intention are scanty and makeshift. As Prof. Alexander Kennedy pointed out at a meeting of the section of psychiatry of the Royal Society of Medicine on Jan. 13, the 1933 Act gave the courts the opportunity of getting all the technical help they need from psychiatrists; but a few unpractical reports may shake a magistrate's confidence in all psychiatrists, and make him unwilling to use such expert advice. All magistrates, it seems, have their psychiatrist stories; and psychiatrists have their magistrate stories too. No psychiatrist can be right every time; but he can avoid some unhelpful practices. Reports are irritating when they propose a utopian type of treatment and are contemptuous of the only methods available; when they defame the parents on hearsay (for the magistrate may need to read out the report in the parents' presence); when they are long-winded and make no recommendation; when they force the child into a theory; and when they camouflage ignorance or inexperience with verbiage. The courts are concerned primarily with the protection of society, and the doctor by long habit is concerned with the protection of his patient. In the children's court, however, the doctor must be an impartial adviser: like the magistrate, he must strike a balance.

Some 70% of young offenders never appear in court again, but that does not automatically make good citizens of them: the ability not to get caught is not a test of good citizenship. Some children seem to have a constitutional inability to conform to the rules of the community: they graduate from probation, by way of the remand home, the approved school, borstal, and prison, to preventive detention. No doubt some of these could be certified as mentally defective, if certification were not chained to the intelligence quotient. Professor Kennedy made it clear that the psychopath who is not spotted and dealt with constructively when first brought into court will return to his own neighbourhood, to waste his own time, cause annoyance, and corrupt others. He believes that observation centres are badly needed where such children could be watched, even if only for a day. Such a centre could serve a number of juvenile courts, and would act as a clearing-house for information for all those working on a case. Dr. J. W. D. Pearce, in the subsequent discussion, wished to see revived the idea of State remand homes—embodied in the 1939 Criminal Justice Bill but omitted from the current one. Professor Kennedy, however, holds that a remand home is not the right place for this work: the observation centres should be closely linked with the homes, but not in them.

Mrs. M. Robinson, who represented the Magistrates' Association, was also warmly in support of observation centres, adequately staffed by a full psychological team of the type found in child-guidance centres. She noted that until recently no child on bail could be seen by a psychiatrist at a remand home: if the magistrates were to get a report in reasonable time, the child had to be remanded in custody. Now it is possible for a child on bail to be examined; and she suggested that the time may have come for all children before the courts to be screened in this way. Certainly it is hard to decide which cases need it, and which can be disposed of without examination. Dr. Peter Scott reported on 25 boys sent to a remand home but not referred for psychiatric examination, and compared their cases with those of 100 boys who had been so referred. The results indicated that those who were not referred were just as much in need of examination as those who were. The difficulty here is that the psychiatrist may be overloaded, and may have too little time to give to each case. Professor Kennedy thought it unwise to extend the scope of the work in this way until enough psychiatrists have been trained to do it. All favoured a closer liaison between the psychiatrist and the probation officer.

PTERINS FOR MALIGNANT DISEASE

UNDER headings like "Vitamins for Cancer" some of the daily papers have lately been announcing the trial of a new drug 'Teropterin' in the treatment of malignant disease and hinting at startling developments. The pterin group of substances suddenly won a place on the therapeutic map when it was discovered that folic acid was a compound of a pterin group, *p*-aminobenzoic acid, and glutamic acid. Folic acid, as is now well known, is valuable in the treatment of the megaloblastic deficiency anæmias. The synthetic folic acid used therapeutically is one of a group of allied substances obtained from liver, yeast, and other sources that are growth factors for *Lactobacillus casei*. It has been established that synthetic folic acid is identical with the *L. casei* factor from liver and that its molecule contains one glutamic-acid radicle. Another form, known as the "fermentation *L. casei* factor," differs from synthetic folic acid only in containing three glutamic-acid radicles connected through the γ-carbon atoms. It is this pteroyltriglutamic acid that has been named teropterin.

The application of such substances to the treatment of malignant disease springs from the observation of Leuchtenberger and colleagues,[1] who gave this fermentation factor to mice with transplanted sarcomas and found that the growth was inhibited. Later[2] they found that a daily intravenous dose of 5 μg. of fermentation factor caused complete regression of spontaneous breast cancer in about a third of the mice treated. When teropterin was synthesised, there was enough for a trial in human patients, so Farber et al.[3] set out to try its effect in a miscellaneous group of patients with malignant disease and allied conditions like acute leukæmia and Hodgkin's disease. They also tried a pteroyldiglutamic acid (diopterin), which is not a natural substance, so far as is known, and has its two glutamic-acid radicles linked through the α-carbon atoms. The report now published is mainly concerned with toxicity, dosage, and the general effects of these two substances. The 90 patients treated were a very mixed group, all with advanced disease beyond the help of other treatment; this limitation necessarily made interpretation of the results difficult and the report says frankly "it is too soon to attempt any evaluation of the action of these substances on the course of neoplastic diseases in man."

Nevertheless, the results so far obtained are intriguing. Both teropterin and diopterin are non-toxic and no important systemic or allergic reactions have been seen; they can be given intravenously or intramuscularly. The dose used was 20 mg. intramuscularly each day for a week and then 50 mg. daily for two or three weeks. The patients generally felt better, had improved appetite, and were less apprehensive; but this might be "ascribed to improved morale resulting from frequent visits . . . and a definite impression that something more than usual was being done for them." Some physical changes were, however, seen that did seem attributable to treatment with the pterin compounds. Examples were: temporary decrease in subcutaneous nodules of an amelanotic carcinoma; temporary shrinkage in the lung metastases from a carcinoma of the testis; degeneration

1. Leuchtenberger, C., Lewisohn, R., Laszlo, D., Leuchtenberger, R. *Proc. Soc. exp. Biol., N.Y.* 1944, **55**, 204.
2. Leuchtenberger, R., Leuchtenberger, C., Laszlo, D., Lewisohn, R. *Science*, 1945, **101**, 46.
3. Farber, S., Cutler, E. C., Hawkins, J. W., Harrison, J. H., Peirce, E. C. 2nd, Lenz, G. G. *Ibid*, 1947, **106**, 619.

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and necrosis of some tumours; and reduction to normal of the serum acid phosphatase in a patient with prostatic carcinoma and secondaries in bone. Such changes, they say, have been by no means constant, and they have "no evidence to suggest that these substances should be employed in the routine therapy of patients with cancer." It is clear, all the same, that the results to date encourage further experiments, and success would open a new approach to the treatment of malignant disease. These pterins are difficult to prepare and are obtainable only in small quantities; so fortunately their use is likely to be restricted to experimental clinics where the results can be properly assessed.

BREAST-FEEDING

IT seems odd that it should ever be necessary to defend breast-feeding almost as if it were an obnoxious practice. Yet in the United States alarming reports indicate that in some centres this is almost the situation. A committee on maternal and child feeding of the Food and Nutrition Board of the National Research Council has issued a report[1] under the somewhat cautious title of "The Advisability of Breast Feeding," setting out the advantages, objections, and contra-indications. First it lists the reasons why breast-milk must be regarded as the best food for babies, both on the positive side as regards its nutritive contents, its economical advantages, and the relative simplicity of its use, and on the negative side (so to speak) as regards its safety. As a prophylactic against gastro-intestinal disturbances the value of breast-milk is not so obvious in the better-favoured economic classes, and this, together with the greatly improved alternative methods introduced in the last quarter of a century, is no doubt responsible for the present transatlantic outlook. The report lays great stress on the value of breast-feeding as an essential part of child care, giving the baby a greater sense of security than bottle-feeding gives; but although nearly a quarter of the report is taken up with these psychological considerations it regretfully points out that "concrete evidence on this point" (i.e., the emotional value of breast-feeding to both mother and child) "is difficult to obtain." The point is strongly made that more should be done before the birth of the baby to prepare the mother, emotionally and physically, for her natural task.

In this view, as in the statement that "the technique of manual expression of milk from the breasts is a valuable means of increasing the supply," the American committee is supported by the writings of Harold Waller in this country. He maintains[2] that the common cause of failure of lactation is an inhibition of what he calls "the expulsive mechanism." To overcome this he advocates measures early in pregnancy to secure a better-shaped nipple in cases of poor development by means of what he quaintly terms "a simple orthopædic appliance"—actually a form of nipple-shield. He teaches all primigravidæ the manual expression of colostrum and asks them to practise this daily during the last six weeks of pregnancy. If the beginning of milk secretion is sudden and threatens to produce engorgement it is controlled by the use of synthetic œstrogens. This treatment is combined with manual removal of milk to ensure adequate drainage at a stage when the baby is not capable of accomplishing this. Waller urges that it is the pædiatrician who should be responsible for seeing that the detailed management of lactation is efficiently carried out. He holds that it is not enough for the children's physician to be called in for the abnormal, the sick, or the premature infant. He must "interfere"—as one maternity department sister put it—a great deal in the management of the normal if breast-feeding is to be safely established and maintained. In the words of the American report: "as a food, human milk still remains the best type of milk for growing infants." It is the task of those working in the field of child health to see that it is in ample supply.

1. *J. Amer. med. Ass.* 1947, **135**, 915.
2. *Arch. Dis. Childh.* 1947, **22**, 193.

TREATMENT OF VAGINITIS

THE popular acetarsol compound vaginal tablets usually give good results in trichomonas vaginitis, and most cases of monilia infection respond to painting with 2% gentian violet, but many of these cures are only temporary, and relapses are particularly difficult to eradicate. Siegler[1] urged that the ideal agent for the treatment of recalcitrant cases should be simple for the patient to apply in her own home, without the assistance of a trained nurse or elaborate apparatus; it should be buffered so as to re-establish the physiological pH of the vagina, thereby encouraging the growth of Doderlein's bacillus (such a pH is about 4·5, and ranges from 3·5 to 5·75); it should be bactericidal to infecting organisms which are liable to cause reinfection, especially after electrosurgical cauterisation of the cervix; it should be of such consistency as to penetrate intimately into the vaginal and cervical mucosa, and in this respect it should closely approach the physical characteristics of the vaginal and cervical secretions; it should be non-irritating and non-toxic over long periods of treatment; and finally it should if possible be lethal to trichomonas, monilia, and the likely infecting bacteria. The agent which Siegler favoured contains 10% sulphathiazole, 3% lactic acid, 1% acetic acid, 0·1% sodium tetradecyl sulphate, and 85·9% polyethylene glycol. The acid jelly base is non-irritant and non-toxic, has good wetting properties, and maintains its jelly-like consistency at body temperature; it can dissolve large quantities of sulphathiazole and itself dissolves in the vaginal secretions. Its pH is 4, and its buffering power is considerable. For introducing this jelly a small paper applicator has been devised, consisting of two cylinders, so that pushing the internal into the external cylinder expels the jelly along the internal cylinder into the vagina. Such an applicator can be used by the patient and thrown away, and is cheap to manufacture. It is of course feasible to add other agents to the jelly-like base, such as 1% gentian violet.

The method was tested on 142 cases of trichomonas infection, 42 monilia, 2 mixed monilia and trichomonas, 40 mixed staphylococcus and streptococcus, and 4 gonococcus infections. Using a strict criterion of cure, the results were 110 trichomonas, 36 monilia, 4 gonococcus, and 40 mixed infections cured. Since 22 of these patients were pregnant and such cases are notoriously difficult, the results are encouraging.

Any method of treating vaginitis or cervicitis demands the untiring coöperation of doctor and patient and constant bacteriological control. Moreover, causes of failure and recurrence must be kept in mind, such as reinfection by the husband, from the patient's bowel, fingers, mouth, or local reservoirs of infection like cervical erosions, Skene's ducts in the urethra, and even the bladder itself. It will therefore be ill-advised for doctors to prescribe this method of treatment without thorough speculum examination, bacteriological study, and culture of a catheter specimen of urine. Siegler himself practises a strict control of vaginal pH, using an elaborate cervical-vaginal combination electrode connected with a Beckman pH-meter.

1. Siegler, S. L. *Amer. J. Obstet. Gynec.* 1946, **52**, 1.

Mr. BERTRAM LLOYD, emeritus professor of forensic medicine in the University of Birmingham and consulting surgeon to the Birmingham United Hospital, died on Jan. 22. The death is also announced, on Jan. 23, at the age of 78, of Dr. EDWARD STAINER, formerly dean of St. Thomas's Hospital medical school.

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Modern Hospitals

IV

HOSPITALS IN THE UNITED STATES

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(*Concluded from p. 154*)

FORM OF HOSPITALS

The physical features of American hospitals are the products of the architectural and engineering skills of the country much influenced by the demands of business-trained administrators.

Hospital authorities recognise that about two-thirds of the operating expenditure on hospitals is for salaries and wages. One consequence is that the prudent allocation of space and integration of services are seen to be major factors in economy and efficiency of operation, and this invites "an extension to the hospital of the line assembly principle which has given America the industrial supremacy of the world. . . ." Approximately half of the hospital payroll goes into non-professional services in kitchen, food distribution, power plant, laundry, store-room, housekeeping, and business office, and these must be located and organised so as to minimise traffic and labour. Similarly, it is stressed that the layout should be such as to eliminate waste of time for the professional personnel. For example:

> "Nursing units should be small enough to permit adequate supervision by one person, but large enough to occupy fully the time of the minimal number of personnel that must be always available—the night nurse for instance." [1]

Therefore hospital planners are enjoined to give careful consideration to the general design of patient areas and to the use of labour-saving equipment. The placing of the ward facilities will determine the number of feet a nurse must travel between the bedside and the various service rooms. Increase of distance reduces by just so much the time the nurse can spend at the bedside, or requires a larger staff.

Some of the older well-known hospitals in the long-settled cities on the eastern seaboard and elsewhere have buildings which, though sometimes more spacious, do not differ markedly from our own, forming an irregular group or mass that has been extended piecemeal from time to time, and when they become obsolescent presenting to the managements the same problems—whether to adapt, or replace on the site, or adapt and extend, or rebuild elsewhere. There are also hospitals of pavilion style—such as that of Chicago University—with a number of detached blocks of fairly recent date forming most impressive architectural groups, as may be seen on the continent of Europe.

In the newer larger hospitals all departments may find a place in one great single building or composite building of great height planned as a unity with administrative and service departments, reception, outpatient, diagnostic and treatment suites, and patients' wards one above the other. Buildings of many stories are widely regarded as having both constructional and operational advantages over low buildings. Building costs, with concentration of sanitary and other engineering services, are lower; less ground is needed, and this may be a decisive factor in cities and towns where sites are scarce and costly. It is estimated that in New York City the ground on which two-thirds of the hospitals stand is worth more than the buildings. In working, staffs have shorter distances to travel and the problem of circulation between departments is largely settled by a generous provision of elevators; it is claimed that vertical transportation is cheaper and faster than horizontal. Conservation of heat in winter and air-conditioning in summer is simplified—and it must be remembered that the United States has a continental climate.

The characteristic elevations of such magnificent piles as the group of buildings of the Medical Centre (Colombia) or of the New York Hospital (Cornell) illustrate the artistic "build-up" possible through a full but balanced application of the principle of vertical construction. The fine White building at the Massachusetts General Hospital in Boston is an example of vertical construction of moderate height that would harmonise in its proportions with many modern city buildings in this country. An extreme example is the new Wesley Memorial Hospital which rears its slender cruciform shaft eighteen stories above ground on a small site by the lakeside at Chicago.

HOW MANY BEDS?

Far-sighted designers of hospitals stress those principles of construction which will allow of the widest variation of use with the least adaptation. The objective is a building of easily convertible and extensible construction around a core or background of fixed but adaptable engineering services. The latter can be made to serve, with appropriate change of equipment, spaces furnished as patient wards, diagnostic or treatment rooms, research laboratories, or suites for teaching. The Cancer Memorial Hospital in New York City is a modern building designed to possess this adaptability. It is plain, however, that those principles are harder to apply in tall buildings where of necessity many if not all the floors have to be planned and replanned within the same rigid common outline, whether for ward units, diagnostic and treatment departments, personnel, or other purposes. Vertical construction inevitably leads to buildings that are monumental rather than functional, at least in the sense that they cannot be so readily planned, varied, or replaced ad hoc and piecemeal as are low buildings whatever be their other disadvantages.

The view is widely held that the number of beds should preferably not exceed 500 in a district hospital and 700 in a base hospital. In a country notable for large-scale construction and organisation the weight of opinion in favour of moderate-sized hospitals amongst outstanding medical superintendents is remarkable, especially since some of those who hold this view most strongly are themselves administering much larger hospitals. They express such personal opinions as the following: that a hospital begins to become unwieldy when it exceeds 500 beds; or that 500 beds is about the minimum that will provide sufficiently large departments for all major services to work efficiently, but that increase above 500 acute beds should be avoided so far as possible. The limiting factors are personal rather than material. It is found in practice that the key members of the staff cease to make their best contribution to the life of the institution as it grows larger, and that even business efficiency is only maintained by more complex organisation.

That patients are mostly fee-paying no doubt largely explains the fact that the reception arrangements in hospitals great and small are generally more comfortable than we are accustomed to in Britain. More and smaller rooms and an atmosphere compounded of the hotel and private practice is the rule. In this country in our larger hospitals the great waiting-hall and benches are traditional, while in many of the smaller institutions some adapted space (even a corridor) may have to serve. For the same reason outpatient departments have been less developed in the United States than here; most patients have gone in the first place to the private "offices" of practitioners, whether or not these are on the staff of the hospital. But the large hospitals are

1. Health Service Areas. Public Health Bulletin no. 292. U.S. Public Health Service, Washington.

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providing increasing space for consultative clinics, and the arrangement favoured tends to make each clinic as self-contained as possible with its own waiting-rooms, office, records, and consulting and treatment rooms. In those hospitals where senior members of the staff spend much of their time in these departments, the atmosphere is that of a continental professorial clinic. There is indeed a tendency to multiply separate clinics for the various so-called specialties in medicine; this may lead to the treatment of organs rather than of individuals, with loss both to general medicine and the discipline of the particular field.

THE WARD UNIT

The ideas behind the planning in detail of the "patient areas" in American hospitals are well exemplified in the ward unit. The same principles are applied mutatis mutandis in diagnostic and treatment departments, and in the rooms used for outpatients.

The hospital planner's desire for compactness in building largely determines the form of the ward unit, and the "corridor" system is almost always adopted.

Sometimes the patients' rooms are on one side of the corridor and the service rooms on the other. Sometimes the patients' rooms are on both sides for at least part of the length of the corridor. Much of the construction is such that there are no breaks in the sequence of rooms on either side of the main corridor and natural lighting and ventilation of the corridor is not possible. The hospital planning experts of the Federal Public Health Service attribute this preference for compactness to the prepotent influence of business management which applies the criteria of business efficiency to hospital construction as well as maintenance. Their model plans favour pavilion-style buildings and interior construction designed to allow more light and air. Medical superintendents and architects generally are, however, not moved by arguments in favour of more open construction: they maintain that it is not practical politics to move from the conventional compact forms. They put their points in such phrases as "central corridors are not objectionable"; "small wards off can be adequately lit and ventilated and the air can be purified"; "light and air are desirable but the change would not justify the cost"; "cross-ventilation is not worth paying for to get rid of the central corridor"; "the decision turns on cost and air-conditioning"; "temperature is decisive—the great extraneous heat and cold in the U.S.A." It is to be remembered that Americans prefer higher temperatures indoors than we do in this country, that air-conditioning is employed far more, and that short of air-conditioning they have frequent recourse to local extraction by small exhaust fans fixed in inside corridors, sluice rooms, and other sanitary offices. One authority observed that "hospital construction must be compact, totally closed and air-conditioned; in some years' time we will think of dirty air as we now think of dirty milk."

The size of the ward unit is determined as a rule by the number of patient beds with their accessory facilities which can be efficiently supervised by one head nurse. The number of beds commonly provided in the general medical and surgical ward units in modern blocks of acute hospitals is around 30. Small wards are preferred. Many old hospitals have most of their beds in large wards, but many new hospitals have no wards with more than 4 or at most 6 beds, along with a proportion of single-bed and 2-bed wards.

The central-corridor system lends itself to small wards, which can be cheerful, well lit, and well ventilated. Many patients prefer small wards, and semi-private patients expect to be in such wards just as private patients expect to have rooms to themselves. The administrator prefers small wards in so far as they make for flexibility in sorting patients on clinical and other grounds, and when the hospital is not full they are economical in staffing. But when wards are used to capacity the same number of patients can be given a better standard of nursing care in large wards than in small wards. For that reason in some of the notable new ward blocks in city hospitals such as New York Hospital (Cornell) and the White building of the Massachusetts General Hospital (Boston) the majority of beds in the ward unit is still being placed in large cross-ventilated wards divided into bays by partitions placed across each side of the ward to leave a central open corridor, with beds placed parallel to the wall and facing each other, 4 in each bay.

The ground-plan of the ward unit varies greatly. There may be one straight corridor with rooms on either side, or the plan may be "L"-shaped or "T"-shaped with service rooms grouped at the junction of the limbs, the corridor being generally not less than 8 ft. across. The arrangement of the components of the ward unit follows very varied patterns though there are certain emphases common in American practice which are different from ours.

The central corridor affords great variability in the positioning of the different service rooms. Care is taken to centralise those rooms most used by nurses, and the American Hospital Association lists these in the order of the amount of use as follows: utility room, nurses' station, linen store, equipment store, kitchen, treatment room, waiting-room, trolley space. Plumbing is freely disposed upon inner walls—which in conjunction with extractor fans gives a greater choice of space for sluicing fixtures, water-closets, and baths, and saves valuable outer wall space.

The utility room is placed as centrally as possible, close to the main group of beds in units with a straight corridor plan, or at the junction of the limbs in "L"-shaped and "T"-shaped plans. It may contain the usual equipment of the customary sluice room—that is slop hopper, bedpan emptier and steriliser, and sink and draining-board. In addition there may be cupboards and racks for nursing equipment, a work bench, a bowl steriliser, and provision for urine testing. In some new construction the utility room is partially subdivided into so-called "dirty" and "clean" sections, and in the "clean" section medicine cabinet and sink, refrigerator for ice, space for flowers to be arranged and stored, and even dressings trays and trolley may be found. There is a tendency to remove bedpan service from the utility rooms and to locate it in a separate room or rooms opening from the main corridor or in part in closets interposed between adjacent 2 or 4 bed wards and not communicating with the main corridor.

The nurses' station fulfils the purpose of the sister's room or ward office in this country. It is generally placed so as to secure the widest and least interrupted visual oversight of the patient's wards and main corridor. One or more desks with telephone, chart rack, and medicine cabinet nearby stands in the corridor or is recessed into the corridor wall. In large-ward construction it may be within the main ward, either at the centre or at one end. This recalls the former practice in this country by which the ward sister when she was not at the bedside sat at her desk with the ward full in view. In some ward units there may be three desks—one for the head nurse, one for juniors, and one for a ward clerk, though there are conflicting views on the value and duties of a clerical officer in wards.

Trays for diagnostic treatment and dressing purposes are stored in or off the treatment room or in the "clean" section of the utility room, but it is now almost the rule in hospitals of 100 beds and upwards for a central supply service to provide in advance an estimated day's requirements of dressings and equipment commonly in use and other items on demand, so little work room and storage space is required. Some hospitals have a central linen supply system, and the size of the linen store will vary accordingly.

The service kitchen varies in size with the method of food distribution adopted in the hospital. In those hospitals where a central service supplies the patients' trays made up complete in the main kitchen direct to the wards on a moving belt or otherwise, the results are said to be disappointing.

A treatment room is provided as a rule in large ward units, and this room is used for examinations and other ward purposes. Waiting space for visitors is generally provided. Similarly, dayroom provision for "up" patients is more often made than in this country, often by way of a solarium which can if need be take beds for convalescents.

INTEGRATION OF SERVICES

The above notes refer primarily to the construction of and arrangements within the larger general hospitals, though the same principles apply mutatis mutandis in

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small hospitals. Separate special hospitals have not had the same importance in the United States as in this country whether historically, clinically, or administratively. True, there have been famous tuberculosis sanatoria, but the greater proportion of tuberculosis patients are now investigated and treated in special accommodation in general hospitals. It is the same for patients with acute infectious diseases, and provision is made at general hospitals in separate wards or blocks for such of them as are treated in hospital. Children's wards, too, are provided at general hospitals, as is also a great proportion of institutional maternity accommodation.

The chronic sick have received no more special consideration than in this country, but, as here, there is a movement to provide improved accommodation and facilities for treatment associated with general hospitals. The Montefiore Hospital in New York City is all the more remarkable because it is exceptional.

Finally it must be said that hospitals in the United States have been even more independent of the health services than in this country. Movements are now on foot to coördinate the work of hospitals and at the same time bring them into relation with the health services. In rural areas a single administration of both health and hospital services is being tested and may be found practically advantageous if only to utilise medical skill to the full. In urban areas and particularly in the great cities there appear to be strict limits to the integration possible in routine work—in part on account of the size and complexity of both services. But the over-all planning of health and hospital services in one coördinated system is being hopefully pursued.

THE FUTURE

The technical aspects of the construction and management of individual hospitals have in the past claimed the chief attention of hospital authorities and medical and technical specialists in the United States. The interests involved have been very large and the bulk of technical and semi-technical publications concerned with all aspects of hospitals has greatly exceeded that prepared in this country. As part of the trend in social affairs generally, widespread interest has of late years been aroused in questions touching the availability of medical treatment for all. In the hospital world the emphasis in current thought, discussion, investigation, and experimentation has therefore passed, as in this country, to the central problems of distribution and coördination of adequate facilities for hospital treatment.

Amongst studies of these problems must be mentioned the recently published authoritative report by the Commission on Hospital Care.[2] The commission has inspired studies in forty States of the Union, but the report is not an inventory of information about local conditions though it is based on a vast amount of detailed knowledge and it describes the procedure and findings of the pilot survey of hospitals in the State of Michigan to which reference has been made. The main purpose of the report is to focus attention on the functions and scope of service of the general hospital, and to show how improved hospital care could be extended to the whole population. The social setting in the United States is different in many respects from that obtaining in this country at the present time, but those who know the American hospital scene will be impressed by the frank objectivity of the report, the recognition of existing limitations in hospital service, and the forthrightness of the proposals to achieve higher general standards through regional planning. The report also contains much of value to those studying the use of hospitals in this country, as in the helpful analysis of such questions as the rôle of the general hospital in the treatment of persons with nervous and mental diseases, the chronic sick, and the convalescent, and the place of rehabilitation in a general-hospital service. The sections on the relations between hospitals and public-health services show how, despite national differences, the same administrative problems and objectives face the health authorities in the two countries.

2. Hospital Care in the United States: Commission on Hospital Care. Commonwealth Fund. New York. 1947.

Special Articles

CHILDREN'S HEALTH IN WAR-TIME

FOOD AND MORTALITY

IN his Report on the Health of the School Child for the years 1939–45,[1] Sir Wilson Jameson, as chief medical officer of the Ministry of Education, notes that the nutrition of public elementary-school children was certainly maintained, and almost certainly improved during the seven years under review.

This conclusion is based on figures provided by the returns from local authorities assessing nutrition, on growth-rates, and on a remarkable fall in mortality-rates. In London, which was evacuated of children more often than any other city, the percentage of undernourished children fell from 4·47 in 1938 to 3·75 in 1945; there was, however, a slight increase in rickets. Figures for England and Wales generally showed that the percentage of children whose nutrition was classed as "good" rose from 88·1 in 1938 to 90·8 in 1945, while those with "poor" nutrition decreased from 0·5% to 0·3%. In 21 areas where records were kept, the average increase in height was $^1/_4$–$^1/_2$ in., and of weight 1 $^1/_2$–2 lb. in 1944 compared with pre-war averages; and some small regressions in average heights and weights in a few areas between 1940 and 1942 were in general made good by 1943.

Sir Wilson attributes the nutritional improvement, first to the brilliantly successful food policy, and then to the better wages of war-time, and the unexpected freedom of the country from infectious diseases. The improvement in infant and maternal mortality, too, has been reflected in the better nutrition of school entrants. Our food policy has been described, by Dr. H. E. Magee, as the first large-scale application of the science of nutrition to the population of the United Kingdom. Everyone—irrespective of income—had access to a diet conforming more closely than ever before to physiological needs; and this was achieved by rationing, by subsidies on staple foods, by home production and imports, and by Lend Lease. Moreover, after some initial confusion, school-children were made a priority class in the rationing of milk, cheese, meat, fats, and sugar. Free school dinners reached their lowest ebb for some fifty years in October, 1939, and the proportion of children in elementary schools who took milk in school fell to about 40% of the total; yet by the end of the war some 2 million children (2$^1/_2$ million, or 50%, by 1947) were having school dinners, and over 70% were having milk. Since September, 1946, school milk has been issued free to all children. This pattern may be compared with that of the 1914–18 war, when school dinners rose from the pre-war figure of 120,000 to 600,000 in the first winter of the war, but had fallen in 1918 to 75,000. Yet an attendance of only 50% of children at school meals is still not enough. In 1943 the Government aimed at providing meals for 75%, but in 1944 a secret building ban, made necessary by the Second Front, and later the V-bomb attack on London, held up arrangements for many of the larger canteens. Standard plans had been prepared, however, for kitchens, dining-rooms, and sculleries in prefabricated huts, and in 1945 the programme was revised; since then, and despite delays, it has attained, the report says, "a large measure of success." Regulations introduced by the

1. H.M. Stationery Office. 1947. Pp. 148. 2s. 6d.

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Education Act, 1944, lay on authorities the duty of employing an organiser of school meals, qualified in dietetics or cookery, and with catering experience, to supervise the dietary, and the buying of food and staffing arrangements, and to plan the development of the whole service.

MORTALITY

Infant mortality fell, over the whole period 1938–44, from 53 to 45, though there was a rise in 1940–41. In children between 1 and 5 years of age the death-rate per 1000 living in the same age-group fell, over the same period, from 4·6 to 2·8; and in the 5–10 age-group the fall was from 1·9 to 1·4. In these older groups, too, there was a temporary rise in 1940–41. The death-rate from diphtheria among children aged 5–10 fell from 32 per 100,000 to 9 over the war years—an effect attributable to the immunisation campaign. Deaths from tuberculosis in children between 1 and 5 showed a rise between 1941 and 1943, but by 1945 had fallen to 41 per 100,000, as compared with 45 in 1938 and 40 in 1939. In the age-groups 5–10 and 10–15 the tuberculosis death-rate also fell, with a temporary rise in 1940–41. The rise in all age-groups was due more to an increase in cases of tuberculous meningitis than of the pulmonary disease.

It is worth noting how small, relatively speaking, was the toll war took of children in terms of violent death. In the age-group 1–5, the death-rate, in 1940, from this cause was 33 per 100,000 living, but this figure had fallen greatly by 1942, and by 1945 was only 5 per 100,000. The average rate for those aged 10–15, over the years 1940–44, was 18 per 100,000. In fact the number of deaths of school-children due to war operations was only about the same as those due to tuberculosis, and substantially less than those due to other forms of violence. Moreover, children "stood up to aerial bombardment with its accompanying terrors with the same courage and fortitude displayed by the civilian population generally."

EVACUATION

But war affected children in other ways; in the reception areas they faced the dual strain of separation from parents and unfamiliar types of criticism. As the report says:

> "Much has been written about the conditions of the evacuees—their uncleanliness, their lack of social training in the ordinary decencies of life—and these revelations gave a salutary shock to the public conscience. It should be remembered, however, that the unbilletable minority gained much more notoriety than the great majority of well brought up and well behaved children who settled down with their foster parents in happy relationship."

The school medical service had much ado to keep up with the fluctuating school populations as children were sent to the reception areas, recalled, and sent back again; but all the essential services were maintained—though modified in some ways—and the amount of treatment given compared favourably with that of pre-war years, in some cases even being extended. More child-guidance clinics were established, and children with speech defects received much more treatment than ever before; and foot clinics under the charge of chiropodists were started in some areas, and have proved their worth. The chapter on the school dental service gives a picture of the many dislocations brought about by war, but it is noteworthy that the Cambridge borough records show a fall in the incidence of caries in 5-year-old children, from 21·5% of temporary teeth in 1938 to 10·8% in 1944. This may be a response to a better-balanced dietary.

In the main the report shows a steady advance in the care and well-being of children through a time when it was not easy to do much for them; and the country may take some pride in a Ministry which rose so ably to a hard situation.

In England Now

A Running Commentary by Peripatetic Correspondents

THE champions take the field in shining armour, and cry like Bolingbroke and Mowbray, before King Richard II, "And as I truly fight, defend me Heaven!" The motives of Bolingbroke and Mowbray, however, were decidedly spotted; and the same may be true of our own contestants. When Mr. Bevan takes stock in private is he so sure that his main concern is for the public weal? Does he perhaps admit that his stubbornness owes something to party feeling, something to a desire to stand well with the Cabinet, and much to his exasperation with those pretentious humbugs the doctors? And are the champions of the B.M.A. so certain that their concern is for the patient rather than for prestige? How many doctors have that humble respect for the doctor-patient relationship which they profess? How many really and regularly put the patient's convenience—not the patient's safety or welfare, for these they certainly respect, but the patient's convenience—before their own? Is there not a strong satisfaction in saying to this one "Do this" knowing it will be done—a satisfaction which has nothing to do with medicine, and which can be dangerous if indulged over a lifetime? Is the fear of a salary, however small, really perhaps a fear of being answerable to something other than a conscience accustomed to making its own standards?

Will posterity regard today's disputants as champions of noble if conflicting causes, or as something rather more closely resembling Tweedledum and Tweedledee?

* * *

Fire, famine, pestilence, and the wily spirochæte seem to be regarded by most doctors with less aversion than mental illness. If they send an acute abdomen into hospital they usually give some indication, however terse, of the history and findings. Not so with patients sent to a mental observation ward. An adequate history arrives in about one case in twenty, usually a psychiatrist's report sent on by the houseman. One can almost sense the distaste with which it is put into the envelope—"It's all nonsense, of course, but I suppose it's the sort of thing you revel in." The more conscientious houseman, who failed forensic so often that he remembers bits of it, writes: "This is to certify that I, Adolphus Snodgrass,* having personally examined John Doe, believe him on my soul and conscience to be a rate-aided person of unsound mind." When John Doe arrives at the observation ward he is embarrassingly normal, he even knows the date, which is more than I usually do. He may slaughter a nurse or two during the evening, but a line from the sending hospital would have helped. Another disconcerting thing that hospitals do is to send in a patient with a diagnosis of "unsound mind" but no mention of the reason for his being in the hospital in the first place. We admitted a man not long ago from one of the more supercilious teaching hospitals with no information at all and found that he had recently had some major abdominal operation; the stitches were still in. They were a little indignant when we rang up to inquire, as if we were poking our noses into what did not concern us.

I must admit that when I was a houseman at my own hospital I conformed to the orthodox superiority, but from my present viewpoint of a cog in the bureaucratic Juggernaut I do notice that local-authority hospitals treat the patients come mania come dementia, while the voluntaries, on the slightest hint that the patient is going to complain about something, whip him into us so fast that he gets hiccups. The inoffensive old lady, too, who gets a little confused after an operation or during a severe illness, is liable to find herself diagnosed smartly as senile dementia. The observation ward can only supply paraldehyde and patience and if this had been done in the first place it might have saved the transfer altogether.

* Dear Dr. Snodgrass of Scotland,—If I choose another name I shall probably offend somebody else and you wrote such a nice letter last time. . . .

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Only once have I come across human beings attempting to hibernate—an old couple in the Romney Marsh who went to bed in November and got up in April, being fed by a distant daughter—though, of course, I have known a lot of people with the hibernating pads under the clavicle and over the upper dorsal vertebræ. I fancy the hibernator induces a protective feeling of awe in the beholder, as the dead do, and as even the man asleep in the club or in the corner of the railway carriage does in a small degree. I feel a fascinated reverence when I tiptoe round to see our hibernators here. There are the two Herald moths, their rich copper caparisons gleaming in the light of a torch, one on the outside of the kitchen door, the other on the wall of the passage, so that when the kitchen door is wide open they are within an inch or so of each other. I wish I knew how and why they came to choose this one spot, but probably it is beyond human understanding. Then there is the Comma butterfly on the ceiling of the shed, a silvery-brown knight with a waist, his dagger alert at his side. Then—and this is my prize hibernator—by lying on my belly and peering under the shed I can see the Large Tortoiseshell, her dowdy cloak concealing her finery. I have known her family for three or four generations now; indeed I knew her in the nursery at the top of the cherry tree, one of a cluster of caterpillars. There are others—Peacocks, Small Tortoiseshells, and Queen Wasps. Their minds, just ticking over, and my mind, ticking a little faster, are focused on the same roseate time—when the sleepers awake.

* * *

Blessed with a qualification registrable in the Great Dominion, the problem of study did not enter into the venture. However one did not foresee that the temperature would be over 90° in the shade on our arrival and that there would be nobody to help us remove our light luggage—some dozen suitcases, a pram, and a cot—to the train a quarter mile distant (or so it seemed). The line for 30 hours was of the single variety, with a siding every mile or thereabouts, and the engine-driver, as he waited, demonstrated his lost patience by rocking his train and tooting the whistle. There was a restaurant car and we did have one meal after queueing for 2 hours. The final run of 8 hours was smooth and cool after an indescribable nightmare of changing trains. The practice was waiting in the midst of the land of plenty with no car and no proper accommodation. The work was just the same, but how different were the methods—penicillin by mouth (in quantity) to the cost of the patient and detriment of the drug; hospitals so efficient and investigations awe-inspiring. The threat of socialised medicine lingered heavy in the hot and thirsty air of the surgeons' room.

Emigrate? Why yes! The food is good, expensive, and plentiful; but don't, don't come via Halifax.

* * *

My native clerk, who speaks pretty good English and has had the equivalent of a secondary education at one of the best local schools, admits that he has never heard of Bach, Brahms, Beethoven, Shakespeare, Plato, Bernard Shaw, Julius Cæsar, Mohammed, Attlee, or Jesus Christ. But he knows all about Churchill. History, he tells me, was one of the subjects in the school curriculum.

* * *

The baby cried all day and he cried all night. He broke off to take a gulp of refreshment and began again with renewed enthusiasm. He had no pyrexia and no abnormal physical signs. All were baffled. The oldest tricks of the ward sister and the newest tricks of the H.P. were of no avail; he bellowed. The Pundit was called in. He examined the bawling brat from head to toe. When all was over there was a heavy silence. "Well, sir?" inquired the H.P., oozing deference from every pore. "I think," said the Pundit, "that child has an unhappy disposition."

* * *

We are asked to deny that Lord Moran and Sir Alfred Webb-Johnson are conjointly fasting until Mr. Bevan reaches agreement with the B.M.A.

Letters to the Editor

CENSORSHIP

SIR,—Of the various restrictions with which we, as doctors, are threatened under the National Health Service Act, surely by far the most serious is that to the free publication of our views on technical and administrative matters, yet this has received comparatively little publicity. We have the precedent that those working under the Ministry of Education and those in the medical branches of the fighting Services have to submit their proposed publications to higher authority for approval, and it is clear that the Ministry of Health is not now in a position to state that the same ruling will not apply to doctors serving under the new Act. Even supposing that Mr. Bevan is prepared to give an unqualified assurance that so long as he is in office he will enforce no restriction, he cannot answer for the action that any of his successors may take by regulation, and as things stand at present they have the power to make such regulations without any reference to Parliament.

Even the most superficial study of history and the happenings in other countries must make it abundantly clear that a scientific profession can only continue to be vigorous and progressive so long as there is complete freedom of discussion. It has been said, with truth, that official censorship of medical publications during the war was benign in the main. But during the war practically all the consultants and most commanding officers were really civilians in uniform, and they had the tradition of civilian usage firmly ingrained in them. The requirements of security was almost the only limiting factor. There is no guarantee that the same will apply once the National Health Service is fully established. Almost certainly as time goes on the vested interests of established official authority will lead in some degree to resentment of criticism and reluctance to accept new ideas. This can only be guarded against by the inclusion in the Act of a clause clearly stating that no official restriction or supervision whatever shall be exercised over the publication of articles relating to technical and administrative matters.

For centuries, ever since the Reformation in fact, we in this country have become so used to complete freedom of expression and have come so to take it for granted that we can hardly visualise the effect of losing it. Many of us during the war were able to see, through our contact with the German medical services, how a once great profession can, in the course of a generation, become degenerate as the result of control by political authority from above. During 1942 I administered a prisoner-of-war hospital for Germans in Egypt. The medical officers were drawn from the Afrika Corps and might therefore be regarded as some of the best in the German army. Their approach to their profession was utterly different from ours. They had never been trained to think for themselves, nor had they been allowed free discussion. They did their work, as it were, by the drill-book. Their minds were closed to reason and the impact of new ideas. They would respond only to a direct order. Never, till then, had I really grasped what fighting for freedom meant. If Mr. Bevan in any way values complete freedom of expression and realises how vital it is if the new service is to be vigorous and progressive, he will be the first to agree to introduce a clause in his Act to safeguard it. If he should refuse to do so it shows that he does not realise the danger, and in fact proposes or at least reserves the right to exercise control. We should indeed be selling our birthright if we agreed to this.

The objections to the Act which have hitherto received most prominence have in the main been based on financial considerations. Without proposing in the least to go into the pros and cons of these objections, I think the fact that they are so largely materialistic has made the general public suspect our motives and has in some degree divided us amongst ourselves. It must be mainly a matter of personal temperament whether a man feels he can do his best work in the security of an assured salary or under the stimulus of competition for patients and capitation fees. Each of us, also, must inevitably be influenced by our own particular circumstances.

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Yet these considerations are relatively unimportant as compared with the right to express and publish our opinions without restraint. Not many countries in Europe can now boast that they enjoy this right. The eyes of Europe and all the world are upon us now to see whether we are capable of establishing the first really successful and vital National Health Service in history. As a scientific profession our suggestions and criticisms should be on the highest possible plane and quite devoid of petty or personal considerations. Freedom of self-expression is the most essential of all freedoms. Let us concentrate on that, and having achieved it, let us throw ourselves heart and soul into making this great social experiment the success that we as a profession and the whole population of our country desire it to be.

Plymouth. W. A. LISTER.

SIR,—Your contributor Dr. R. R. Willcox, though he only referred to the censorship of medical articles, raised a matter of the first importance. He ends his letter with the words "Let our planners . . . ensure that no smell or fraction of censorship for any reason, by anybody other than the editor of a journal, be ever contemplated in the New Order that is upon us." Doubtless he would extend his alarm to cover books as well as articles.

This matter was taken up in the House by Mr. I. J. Pitman who asked the following question:

> "What are the general principles under which State employees are allowed or forbidden for payment to write for publication on technical matter peculiar to their specialisation; and what differences are there in the particular cases of the Royal Air Force and the Air Ministry, the National Coal Board and Decentralised coal units, and the medical services and the Ministry of Health when the appointed day is past?"

Mr. W. Glenvil Hall (Treasury) replied on Nov. 6, 1947:

> "A Crown servant must obtain the consent of the head of his department for the publication of any work, the subject matter of which is connected with his official duties or those of other public servants. In cases where the work is considered to owe its value exclusively to the author's ability and research, no special financial arrangements are made. In other cases the Government may either arrange for official publication or stipulate that copies should be supplied for the public service at a special rate. These rules apply to the Royal Air Force, Air Ministry, and Ministry of Health. I have no information about the arrangements in the coal industry which are a matter for the National Coal Board itself. I understand that no rules have yet been made for employees of the new bodies set up under the National Health Service Act."

From this information it would appear that everything will turn on whether a doctor will be classified as a "Crown servant." If he is so classified under the National Health Service Act, it seems clear that he will only be able to write and publish, whether it be a letter, an article, or a book, subject to "the consent of the head of his department." From the point of view of censorship of medical writing the operative words in this parliamentary reply are "Crown servant." I wonder has anyone thought to ask whether under the new National Health Service Act doctors, either already are, or may at some future date by decree or regulation, be classified as "Crown servants," for so far as censorship is concerned everything will turn on that.

The situation is at present obscure: it would be as well for everybody if it were made abundantly clear whether the freedom of any member of the medical profession to express his opinion in correspondence columns, in articles, in books, or by any other means, will or will not be curtailed or denied. There could hardly be a greater calamity from the national or the medical point of view than the imposition of a censorship on the profession.

R. F. WEST
Chairman, Medical Group, Publishers Association

London, W.C.1.

*** Doctors directly employed by Government departments are Crown servants. In the National Health Service general practitioners will have contracts with local executive councils but will not be "employed" and will not be Crown servants. Doctors working for hospitals will be employed by boards of governors or regional hospital boards: the risk of their becoming Crown servants was deliberately removed by sect. 14 (1) of the Act. Doctors having contracts with local authorities are not Crown servants.—ED. L.

PHARMACY OF SODIUM p-AMINOSALICYLATE

SIR,—The encouraging results reported by Dempsey and Logg [1] with p-aminosalicylic acid (P.A.S.) in certain forms of tuberculosis and the fact that supplies are now obtainable are likely to lead to further clinical investigation of this compound. It is regrettable that Dempsey and Logg did not describe the materials they used, either the acid itself or the sodium salt, the method by which the sodium salt was prepared from the free acid, or how solutions of it were sterilised and made fit for parenteral use. Unfortunately the only information on these subjects previously reported in this country, by Whittet,[2] is inaccurate. Acceptance of the statements contained in Whittet's paper would inevitably lead to serious errors in attempts to assess the value of P.A.S.

Whittet, who must have been working with impure materials, describes the acid as cream-coloured crystals melting at 140°C with decomposition and soluble in water to the extent of 0·25% at which concentration the solution has a pH of 3·5. He further describes a method of preparing the sodium salt for injection by dissolving 6·5 g. of sodium hydroxide in the minimum amount of water, adding 25 g. of P.A.S. crystals mixed in a little distilled water, dissolving, and adjusting the volume to 100 ml. This he claims will give a 25% solution of sodium p-aminosalicylate, and he further adds that the solution may be sterilised by autoclaving. These statements are incorrect.

p-Aminosalicylic acid was prepared in these laboratories some time ago and is now undergoing clinical trials. The synthesis and isolation of the pure acid proved extremely difficult. The pure substance was found to be a white crystalline powder melting, with decomposition, at 150–151°C, as previously reported in the chemical literature. The cream-coloured powder that Whittet mentions certainly contained substances other than P.A.S., and as a rule such powders have melting-points well below 150°C. The acid itself is sparingly soluble in water—less than 0·1% at 20–25°C. At temperatures above 80°C aqueous solutions of the amino acid, or of its hydrochloride, are readily decarboxylated to give a brown solution, mainly of meta-aminophenol. Solutions of the sodium salt undergo a similar decomposition at this range of temperature.

The neutralisation of p-aminosalicylic acid to form the sodium salt should only be done with mild alkalis such as sodium bicarbonate or even sodium carbonate. A solution of sodium p-aminosalicylate thus prepared is water-clear, as would be expected. If excess of alkali is present the solution gradually turns brown on standing, for hydrolysis takes place; the decomposition produced by small amounts of excess alkali can be considerably hastened by gentle heating. It is not feasible to prepare the sodium salt from strong alkalis because the acid decomposes immediately it is brought into contact with caustic, giving a dark-brown or almost black solution of various disintegration products, which contains very little sodium p-aminosalicylate. The appearance of these dark solutions is scarcely if at all altered by heating—even at autoclaving temperatures.

Solutions of sodium p-aminosalicylate for injection must, therefore, be practically water-clear if they are to be fully active, and they cannot be sterilised by the ordinary methods of heating; at present there seems to be no alternative to filtration through a Sietz filter.

It may be significant that Dempsey and Logg obtained their best results in empyemata. They say definitely that their most outstandingly successful case was treated by the intrapleural injection of a 5% *suspension* of the acid itself. Earlier, however, they refer to 5% and 10% aqueous *solutions* of the acid having been injected intrathecally and intrapleurally. Presumably these solutions contained the sodium salt, for the low solubility of the acid makes it impossible to prepare solutions of these strengths. One would therefore infer from their paper that the best result was obtained in empyema where a 5% suspension of the acid was used, and that other cases benefited, but to a lesser extent, from injections of a

1. Dempsey, T. G., Logg, M. H. *Lancet*, 1947, ii, 817.
2. Whittet, T. D. *Pharm. J.* 1947, **105**, 133.

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10% solution of the sodium salt. One would have expected a sodium salt solution of twice the strength to have been at least as active if not rather more so, than the weaker acid suspension, and one wonders whether the apparent lesser activity of the solutions was not due to the methods of preparation and sterilisation adopted.

The low blood concentration achieved by administering P.A.S. by mouth (2–7 mg. per 100 ml. from 10–15 g. daily [3]) make it likely that clinical investigators will favour parenteral injection. For this purpose sterile solutions of the soluble salts of P.A.S., such as the sodium salt, must be used, and the purpose of this letter is to obviate some of the confusion and errors that may well arise in the preparation of these solutions.

JAMES A. O'CONNOR.

Laboratories of Messrs. Ward, Blenkinsop & Co. Ltd., London, W.1.

*** We understand that the Scandinavian workers consider the purity of solutions of sodium *p*-aminosalicylate of no great clinical significance, and that in-vitro tests have demonstrated an effective bacteriostatic activity in brown "impure" solutions. Further studies on these lines are clearly required.—ED. L.

MYANESIN ANÆSTHESIA

SIR,—In view of recent accounts of hæmolysis and renal damage following upon the use of 'Myanesin,' this case is of interest.

A boy of 12 years was admitted with three months' history of subacute appendicitis with exacerbation of symptoms during the 24 hours before admission. There was no past history of renal or blood disease.

Appendicectomy was performed the same evening, and an acutely inflamed appendix removed, the operation was uneventful. Premedication consisted of 'Omnopon' gr. 1/6 and scopolamine gr. 1/300. Anæsthesia was induced with thiopentone 0·25 g. intravenously and continued with nitrous oxide, oxygen, and ether by Boyle's machine; 8 ml. of myanesin solution (10% *w/v*) was given after induction. Anæsthesia was uneventful.

The next morning the patient passed 8 oz. of blood-coloured urine; there were no associated urinary symptoms. The urine was found to contain much free hæmoglobin, granular casts, and a few leucocytes and red blood-cells. The patient felt well, and there were no abnormal findings on physical examination.

Urine passed thereafter was perfectly normal. No symptoms developed and there were no abnormal findings. There was no jaundice; the van den Bergh reaction was not tested. The patient's further progress was uneventful and he was discharged well seven days later.

It is suggested that this symptomless postoperative hæmoglobinuria was the result of intravascular hæmolysis due to myanesin given during the operation.

Metropolitan Hospital, London. C. B. NOBLE.

TREATMENT OF ARTHRITIS BY INTRA-ARTICULAR INJECTION

SIR,—The paper by Dr. Baker and Dr. Chayen (Jan. 17, p. 93) is the first serious attempt to appraise the value of acid injections into the arthritic joint. I trust the authors will forgive me if I offer some criticisms.

They say: "While under injection treatment patients have received no other form of therapy." This is at variance with their earlier statement that "non-weight-bearing exercises are taught to each patient," and that these are started "immediately after the injection." It is my impression that the average arthritic knee is considerably improved by physiotherapy alone, whereas the arthritic hip tends to resist treatment. The bulk of their patients were affected by arthritis of the hip or knee, and it would not be unfair to assume that the patients with arthritis of the knee might have benefited as much from exercises alone. Unfortunately figures are not given to indicate separately the results of treatment on knee and hip, whether affected by atrophic or degenerative arthritis. To my mind, the crucial test is the effect of such treatment on the inaccessible hip.

The criteria offered as proof of joint puncture are not sufficiently stringent to ensure that the hip-joint was entered. Crepitus may arise from periarticular structures, and the other indications are too vague. Experience with this procedure has taught me that nothing less than simultaneous injection of an opaque dye will indicate the ultimate site of the injection, and that humility comes quickly. The knee of course is more accessible, but the merit of the injections is less obvious. However, if any benefit from this form of therapy is due to the anæsthesia obtained, then periarticular injection may be as desirable as intra-articular.

Two fundamental questions remain to be answered: the relationship of joint pH to the disease process, and the effect of acid injection as judged by a controlled series of cases.

County Hospital, Farnborough. DAVID P. NICHOLSON.

TETRAETHYL AMMONIUM BROMIDE

SIR,—The article by Professor Boyd and his colleagues (Jan. 3) is a valuable contribution to our knowledge of the pharmacology and clinical use of this product. I feel, however, that the condemnation of the drug by this distinguished team may possibly be premature. In a considerable number of cases of vascular disease both functional and organic, I have found tetraethyl ammonium bromide (furnished by the courtesy of Messrs. Boots) useful as a preoperative test.

It is unlikely, of course, that any preoperative test that may be devised will have a sufficiently definite and localised point of action to give a result exactly comparable with the physiological disturbance ultimately achieved by various forms of sympathectomy.

The advantages of tetraethyl ammonium bromide as a test substance are the simplicity of its administration, the rapidity with which the results are obtained, the short duration of its action, and the relative absence of complications. In my hands it has given results fairly directly comparable with those achieved by, for example, spinal anæsthesia, paravertebral block, and methods of producing thermoregulatory vasodilatation. Therefore, although early claims for the therapeutic efficacy of this drug must be discounted, it is desirable that, while preoperative tests as a group remain relatively unreliable and often tedious, this elegant and harmless test substance should not lightly be discarded.

Glasgow. W. ARTHUR MACKEY.

SHOCK IN OBSTETRICS

SIR,—Professor Sheehan, in his article of Jan. 3, remarks that "in obstetric patients with shock alone, or with shock and only a minor degree of hæmorrhage, there is no evidence that blood-transfusion is of any value whatsoever in saving the lives of the patients." This is again emphasised in the summary, and one might infer that transfusion in general is contra-indicated, since no other form of transfusion is mentioned.

His conclusions are not surprising, however, since whole-blood transfusion never has been accepted as the treatment of shock, nor would one expect it to be. After hæmorrhage whole-blood transfusion is ideal, but the loss of blood-volume in shock is due to plasma loss, and it is accompanied by pronounced hæmoconcentration. Under these conditions plasma transfusion is indicated, and it is possible that with this therapy Professor Sheehan's figures in the shock-alone group would not appear so discouraging.

Titchfield, Hants. P. M. VASEY.

*** We have shown this letter to Professor Sheehan, who writes: "The remarks on the treatment of shock were restricted to the value of whole-blood transfusion because this was the only matter on which we had adequately controlled facts. The figures were obtained in the period before 1941 when whole-blood transfusion was very widely accepted as the correct treatment for shock, and plasma could not be obtained in the quantities available today. Plasma transfusions, intravenous saline, and intravenous glucose (isotonic and hypertonic) have however all been given extensive trial at Glasgow Royal Maternity Hospital; the effects were not very dramatic, but the figures are unfortunately not of real value as the method of control broke down owing to war conditions. The fact that these lines of treatment were not discussed in the paper should not be taken as

3. Lehmann, J. *Lancet*, 1946, i, 15.

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meaning that they are contra-indicated. What is to be emphasised is that the value of these lines of therapy should be assessed not on theories of the ætiology of shock but on the actual results of treatment of patients. It is very much to be hoped that someone will carry out a controlled study of the effect of plasma transfusion on the mortality in the various types of shock not associated with hæmorrhage."—ED. L.

TO THOSE UNDER FORTY-FIVE

SIR,—I feel sure that Mr. Layton's exhortation in your last issue will make an appeal to a minority of those who, like myself, are under 45 years of age. All of us who have the professional integrity of our calling foremost in our hearts have been glutted with a surfeit of data and detail relevant to the National Health Service Act, and it is not surprising that many of us have been caught up in a vortex of uncertainty from which it has been difficult to extricate ourselves.

We have been advised to temper our deliberations with reason and due consideration of the facts and to curb our emotions. I suggest that Mr. Layton has failed to appreciate that many of us in his specified age-group have experienced the satisfaction and gratification which accrue to medical practice in which our scope and opportunities for initiative and hard work have been unhampered by regulation and control, and which have entailed personal sacrifice and hardships perhaps similar to those quoted by Mr. Layton. I would remind Mr. Layton that it is due to the fact that he has enjoyed professional liberty and freedom, and to his willingness and capacity for hard work unfettered by any restrictions, that he has been able, substantially, no doubt, to increase his assured income of £87 10*s*. Yet he adjures us to join a service which denies to us the privileges which he has enjoyed and to accept an assured income which will banish carking care and financial insecurity and which simultaneously will banish professional freedom (not at stake in 1911), will stifle initiative, and will reduce us to automatons bowing our heads to the dictates of an impersonal Ministry. Let us be assured that we can retain our professional independence untrammelled by Ministerial strictures, which the Act does not afford us *in its present unamended form*—this is the point at issue *not* that of remuneration—and all resistance to the N.H.S. Act would end.

I would adjure those men who have never known the satisfaction of medical practice with its patient-doctor relationship unthreatened by interference from a third party, but who have spent their first impressionable professional days in one of the Services where, except in action, this relationship does not exist, where bureaucracy fosters indifference, and where direction and financial security tended to smother initiative except in those of us with irrepressible enthusiasm, carefully to consider Mr. Layton's advice. If they do accept his advice they will be depriving themselves of the one vital, dynamic, and animating experience of their professional lives.

I contend that those of us younger men who have known this professional freedom which, may I remind Mr. Layton, has been attained and maintained by our seniors and their fathers before them, would be guilty of the basest disloyalty to them if we wantonly signed it away. We can sign a pact with the Minister should we feel so inclined, but there exists already an unwritten and inviolable covenant between the patients, who are the nation, and us as a profession. Mr. Layton may accuse me of allowing my emotion to overrule my reason, but where facts and figures may guide us they are no substitute for an ideal to inspire us or for leadership. I fear that Mr. Layton has singularly failed to give such inspiration and leadership to those of us who look to him who "has been through it all"; for we look in vain.

Bristol. W. RUTHERFORD BLACK.

SIR,—There are substantial reasons why the younger members of the profession should elect to enter the National Health Service.

The white-paper published in 1944 stated that "the need is twofold, more specialists and a better distribution of them." The hospital surveys organised by the Ministry of Health showed that many hospitals had too few specialists, and it will be the duty of the regional boards to remedy this deficiency. There will therefore be many more appointments available to young would-be specialists than there have been in the past.

The young doctor who wishes to become a general practitioner in the new service need no longer be handicapped by lack of capital or be tempted to burden himself with debt. Providing he can obtain the necessary accommodation, he can now make an application to enter general practice which, after July 5, must necessarily be accepted unless the Medical Practices Committee decides that the district in which he wishes to practise has sufficient doctors in the public service. As is well known, he will receive a basic salary of £300 from the start, a sum, however, which could well be doubled in view of the rising cost of living. The local executive council will also be empowered to purchase suitable houses for young doctors who could not otherwise enter the service. Even more important to the young doctor than these material advantages will be the greatly improved conditions for medical work that will be created in the new service. As the local authorities carry out their obligations under the Act to build health centres, the general practitioners who enter them will find that the assistance they receive from clerks and various medical auxiliaries enables them to devote all their time to their proper work—namely, the diagnosis, treatment, and prevention of disease.

The National Health Service Act is designed to improve the medical services and to spread them fairly throughout the country. It will help to remove the dread of illness by abolishing the burden of doctors' bills, and will take the financial considerations out of the doctor-patient relationship. It should therefore appeal to every young doctor who is anxious to practise his art and science to the best possible advantage.

Sheffield. JOHN PEMBERTON.

BY DAYLIGHT

SIR,—You refer to the National Health Service as "essentially a non-party measure"—a phrase which, though it passes muster without close scrutiny almost everywhere, should be challenged as inaccurate. The Act is in no sense a non-party measure; it is an all-party measure, a very different thing.

It is beyond argument that the foundations of the National Health and Insurance Acts were laid during the war by all parties in coalition, and that the main lines of these measures were included in *all* the party programmes placed before the electors in 1945. That is to say that no conceivable opportunity was ever given to the electors of voting against these measures, nor did any of the parties provide a platform for expressing opposition to them. The sole exception to this occurred at Berwick-on-Tweed, where the electors seized the opportunity of rejecting Sir William Beveridge, whose name at that time was almost synonymous with the idea of the national health and insurance schemes.

In the face of these facts those who maintain that this Government has, or any alternative Government might have had, a mandate from the electorate for a comprehensive health service or for any other plan carefully protected from the possibility of any adverse vote, are being merely perverse.

The assumption that when the parties and the papers are unanimous about some scheme, the people are likewise, is transparently unjustifiable.

Bangor, Caernarvonshire. C. G. DOBBS.

SIR,—I am a single-handed general practitioner, and am under 40; so I can remember the aspirations of younger days and have gained a little from 15 years of practice. I am the last of five generations of general practitioners, and have all the hereditary love of the best traditions of this vocation. I have no connexion with any of the parties in power, but I have staked £1000 on the strength of my conviction that the cause for which the B.M.A. is striving is just and right. I was profoundly interested in your leader By Daylight and feel that your challenge "that an aggrieved outcry is acceptable only from people who have something better to propose" must not go without an answer.

A comprehensive service is an ideal which has been long desired. An adequate minimum standard of medical care should be available to every man, woman, and child, irrespective of means, and there should be an

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adequate minimum of power vested in a *suitable* authority to enforce this and to protect those who can least protect themselves. The "100% issue" is simple: all should pay, all should have a right to the *satisfactory minimum* standard. But all should have the right to buy in addition "luxury," non-essential, and other forms of service, provided these do not interfere with patients unable to afford such extras. In other words, the service should be offered universally, *not* enforced. Under such a régime private practice for fees and the National Health Service could flourish together, with minimum friction and mutual benefit.

A workable alternative to the suggested general-practitioner administration is one based locally on the present N.H.I. organisation, with power to act within wide limits on its own initiative, to suit the varying needs of different localities; with a regional board for each hospital "area" as defined in the N.H.S. Act, having power of direction and veto of all the medical activities in the area. This power would be subject to the right of appeal by the local committees to the central responsible authority. This method would strengthen the bonds between the various branches of the service, instead of sundering them still further as the Act does in its present form.

Now we come to the real crux of the matter—basic salary, abolition of goodwill, and the right of appeal.

The *basic salary* has advantages in a strictly limited sphere. It would be excellent to assist young doctors by this means, either as a yearly salary for a limited number of years, or as a lump sum held in trust by one of the local bodies, or the central body, to enable the beginner to purchase a practice on part, and in part to assist him to get under way when commencing medical practice. Also as "hard-lying" money in undesirable areas to make them desirable; and in other specific instances it would do much to lessen difficulties. Competition for patients has in the past been controlled by "ceilings." Local committees should have power to adjust "ceilings" to local needs—e.g., the balance between doctors and patients. Where there is gross maladjustment the offer of "hard-lying money" in the area will soon readjust it, and the "ceiling" can be altered as the new doctors come into the area.

On *certification* the Government dare not voice their fear. The Lord Chancellor let slip a few words to the effect that the financial solvency of the National Insurance scheme depends on adequate control of certification. But will fear of offending the Boss improve the allegedly parlous certification, at present controlled by fear of offending patients? It will put the shoe on the other foot; but with only one shoe a man will limp, on whichever foot he wears it. Some means must be found to lessen our writer's cramp and to remove the burden of being judges over our patients. Our rôle should be that of an advocate, not a judge. We demand the privilege of representing our patients, and protecting their interests. Judgment should be in the hands of impartial bodies with the power of rapid appeal to an arbitrating "somebody," in all the frequent difficult and individual cases which may crop up. For example, all certificates of incapacity running more than three consecutive weeks, or more than four weeks' total in any year, might automatically be brought to the notice of the impartial body. By this and other similar regulations our life would be rendered happier, and the solvency of National Insurance protected.

If the retention of the *goodwill of practices* renders the correction of maldistribution difficult, then let the local committees buy the practices from the open market in these admittedly (by Bevan) few areas and install newcomers free of capital expenditure, holding the goodwill under a mortgage basis—or let them use the preliminary basic salary assistance as a lump sum in trust. I deny that the Minister requires powers of negative direction: the only power required is one of positive financial attraction, with as a last resort the power of appointing full-time salaried medical officers to fill the gaps temporarily or permanently, as the need requires.

Appeal.—The present power of our own tribunal, the General Medical Council, is recognised as a terrible one. I know no valid reason which would justify the Minister in delegating this terrible power to any new body without its unique knowledge of the "common law" specific to medicine. In view of the complete monopoly enjoyed by the proposed central authority over medical employment of every kind, it is only right and proper that the power of expulsion from the service should be vested in the most careful, informed, and impartial hands. I know none better than the present G.M.C. Your words "localisation of mischief" do not ring true when the tribunal's power is that of the G.M.C. What matters it to the doctor whether proceedings are public or private, when his professional career in the whole United Kingdom is at stake?

I still accuse the Minister of conceding nothing to the Negotiating Committee. I further state that he had no intention of conceding; that the whole negotiation was a blind to gain time and to wear us down. All concessions so far obtained were extracted under pressure, and as soon as we relinquish our birthright he will make us pay dearly. May the comprehensive medical service come as soon as possible; but let doctors beware of linking themselves and every doctor as yet unborn to a loveless political marriage—to a soulless machine without a drop of the milk of human kindness to oil the bearings.

Southport. J. GARNETT SHELDON.

*** We stick to our words "localisation of mischief." If it is represented to a tribunal that a practitioner should no longer remain on the list of a local executive council, the case (if the doctor wishes) is heard privately instead of in open court. Successful or unsuccessful, he avoids publicity; which is important because, judging by experience of Ministerial action under National Health Insurance, the tribunal will rarely exercise its further power to direct removal of his name from the lists of other local executive councils. —ED. L.

RIGHT OF APPEAL

SIR,—It would seem that the Minister has not quite appreciated the nature of the demand for an appeal to the courts. It is well known that all citizens have a right to appeal against any Minister who acts beyond the powers which he has been given by Parliament. What is now desired is a right of appeal against a Minister who acts within those powers but in a manner which the profession considers unjust or oppressive. The point at issue need not involve the removal of a practitioner's name from the list (with which alone the tribunal can deal) but might be an injustice in some other sphere, affecting either specialist or practitioner. Long years ago a Minister of Health imposed a fine of £1000 upon two medical practitioners. This was felt to be unjust but there could be no appeal because the Minister by Act of Parliament had discretion to impose such a fine. The profession now asks that a right of appeal shall lie against the Minister even when he can claim that he is acting within the powers conferred upon him. These powers are so enormous and so indefinite that the need for an appeal is very much more evident than any good reason which the Minister may have for objecting to it.

Sevenoaks, Kent. GORDON WARD.

SALARY AND CAPITATION FEE

SIR,—There has been scarcely any comment on the experience gained during the last 25 years in the administration of the general-practitioner service in the Scottish Highlands; yet the resemblance of the position of doctors in the Highlands' Service and in the National Health Service is so close that it would surely repay study.

There is a basic salary varying from £300 to £600 according to the nature of the practice: it is true that this is called a mileage grant (presumably to overcome the prejudice of some doctors to receiving their income in the same form as the Prime Minister), but it is a fixed sum. The rest of the doctor's income is made up by capitation fees from insured patients, by fees (limited by regulation) from self-employed persons and the families of the insured, and by private practice. Appointments are made by County Councils and approved by the Department of Health: practices are not saleable, at least officially. A practitioner in the service may have his contract ended for negligent or unsatisfactory service, and the only appeal to the courts is in common law. "Direction" is imposed in exactly the same way as is suggested for the national service—i.e., no new grant is provided unless it is judged that there are not enough doctors in the service.

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It should surely be possible to obtain the opinion of the doctors in this service as to whether they find these conditions irksome or not; in particular, their experience of the basic salary and of the right of dismissal would bear directly on two of the main points on which opposition to the National Health Service is concentrated. I give, for what it is worth, my own knowledge of the views of general practitioners in the Highlands' Service, numbering some 150, gained during the eight years in which, as consulting physician, I was on intimate terms with most of them. Although there was often dissatisfaction with the amount of the salary, I never heard any complaint that it impaired professional independence. The administrative yoke was considered to sit lightly; there was no case of compulsory ending of a contract, so far as I know, during these years, although inevitably there were rare examples of unsatisfactory service. It was generally agreed that in these rare cases there was in fact an over-scrupulous tenderness towards the doctor's interests, and I was assured that rigid proof from the patients themselves of grave neglect would be the sole ground for considering dismissal. The inability to sell the goodwill of a practice was only felt as a hardship when the outgoing doctor had himself paid for the practice, and no compensation was offered. The absence of a superannuation scheme was felt as a severe handicap. In spite of this, and of the relative isolation, there was no lack of competition to obtain a Highland practice.

The conditions which made subsidised practice essential for the Scottish highlands are only an exaggeration of those obtaining everywhere—i.e., the inability of most families to pay the doctor an economic fee so that they may call freely on his services.

Bickley, Kent. DUNCAN LEYS.

SIR,—In his letter of Jan. 17 Dr. Leeson tabulated what he considered to be the relative advantages of payment by salary and by capitation fee, but the doctors to whom the column "salary" apply are obviously conscientious, while those in his "capitation fee" column are obviously unconscientious. I suggest that his table should be a double one, as follows (Dr. Leeson's items are italicised):—

(*a*) CONSCIENTIOUS DOCTORS

SALARY	CAPITATION FEE
1. *No competition for patients.*	1. Competition for patients scorned.
2. *Little financial incentive to increase work: therefore sufficient time can be given to patients.*	2. Finance not considered, therefore sufficient time is given to patients.
3. *Coöperation between doctors at health centres would be easy.*	3. Coöperation between doctors at health centres would be easy.
4. *Doctors my colleagues.*	4. Doctors my colleagues.
5. *Patients would have the advantage of general-practitioner consultations.*	5. Patients, except in partnerships (which are usual), would have to depend on specialists for consultations (in any case they would expect this, after Mr. Bevan's promises).
6. *Doctor can practise his craft.*	6. Doctor does practise his craft.

(*b*) UNCONSCIENTIOUS DOCTORS

1. Competition to get rid of patients.	1. *Continuous competition for patients.*
2. No incentive to work (money or conscience); therefore minimum of time given to patients.	2. *Strong financial incentive to take more work than can be done well.*
3. Coöperation with fellow spivs on golf course, while conscientious doctor works at health centre.	3. *Coöperation between doctors at health centres would be very difficult.*
4. Fellow spivs my colleagues; non-spivs my enemies.	4. *Doctors my rivals.*
5. Patients readily passed on to anyone, preferably to a specialist.	5. *Patients would have to depend on specialists for consultations.*
6. Having little or no craft to practise, doctor prefers other things.	6. *Doctor builds up a business connexion.*

In practice in various countries and various parts of England I have encountered not a few of the "spiv" type of doctor, but, I'm glad to say, very many more of the conscientious type.

Wool, Dorset. THOMAS B. L. BRYAN.

THE PLEBISCITE

SIR,—Parliament, claims the Minister, has decided how the country can best have the complete cover for health which they deserve. But what many politicians (not only Socialist ones) do not understand is that there are large tracts of communal life in which "politics" is out of its depth. The State is too clumsy and is not competent to rule and direct cultural and spiritual activities. It is therefore in the very nature of things that it can have only limited functions in the development of Medicine and of medical practice. It can try to provide conditions in which good doctoring can flourish, but it can never compel good doctoring. It can only solicit it, only pray that individual doctors will do the doctoring well and devotedly; and to get that, it must achieve our free coöperation, accepting whole-heartedly the freedom, diversity, independence, and individual responsibility which go with it. For Medicine is a cultural body in its own right, like the Church, with a heritage, tradition, internal discipline, and ethos which are natural to it. All this has grown out of the intensely personal nature of medical practice.

By this Act, does the State threaten to invade the freedoms which are right and proper to our medical order? That is the cardinal issue, for if it does invade them, the plan will harm not only the profession but also the community, and on that there can be no compromise, now and always. You, Sir, say that "the Act cannot be rejected because of a vague dislike of the whole affair"; but surely the proper emphasis for us is that the Act cannot be accepted unless we are fully satisfied that the freedoms appropriate to a cultural body are preserved? For these are the very foundations of good doctoring.

What answer is the consultant to give? There are three views open to him. He may feel that the Act is a good one, and have no qualms about it. He may take the view that no individual can make a right decision in vacuo or in advance, and that not until he knows the terms of his own individual contract can he decide whether it is right for him to enter the service or not. He may feel, on the other hand, that a comprehensive medical service which comprehends the public organisation of virtually all medicine must the more meticulously guard the essential professional freedoms: that if freedom is lost to one member of the cultural body, any freedom the other members retain is unlikely to endure for long—in other words that he and his G.P. brethren stand or fall together.

Each individual must answer these questions as understanding and conscience direct. My own surmise is that we shall have a desperate fight to keep the essential freedoms—not because the politicians are consciously totalitarian, but because they believe with faith and fervour that to nationalise Medicine is the only way of eventually "getting the best that a great profession can give." I fear that they will have neither the understanding nor the patience to cultivate the soil and let things grow naturally and at their proper pace. In any event, it is only if we on our part see clearly the issues which alone can justify our making a stand, *contra mundum* if necessary, that we shall be equipped, "having done all, to stand fast."

Liverpool. ROBERT COOPE.

SIR,—Having stripped the luxuriant growth of verbiage from this sordid row—so characteristic of the third-rate age in which we have the misfortune to live—there abideth three things: the Politician, the Doctor, and the Patient—and the greatest of these, as is sometimes forgotten, is the Patient.

It is because the implementation of the Act in its present form can further only the interests of the Politician (of whatever colour) at the expense of the Patient that it should be vigorously opposed.

Crediton, Devon. L. N. JACKSON.

SIR,—It is dispiriting that doctors, who are supposed to have been trained to be objective and impartial, can vote in a plebiscite organised by a body whose

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propaganda machine is beforehand working at full pressure to bias the voter. Fair-minded doctors, whether for or against State medicine, can only boycott the B.M.A.'s plebiscite and demand that any census of opinion shall be entrusted to an independent, non-political, purely statistical agency.

To regard as reflecting the truth the result of such a "plebiscite" as that of the B.M.A. is not reasonable.

Whitchurch, Hants. BENJAMIN LEE

SIR,—Since so much depends on the B.M.A. plebiscite, its form clearly demands most careful scrutiny. It seems to me that two questions have been telescoped into question (A) which reads: "I approve (disapprove) of the N.H.S. Act 1946, in its present form." Two sets of doctors will disapprove—namely, those who dislike all forms of State medicine, and those who disapprove of the particular service as set out in the 1946 N.H.S. Act. A good many of the latter may disapprove of one or two small particulars only. In this way a false impression of objection to the whole of the 1946 N.H.S. Act can easily be created. The same to some extent applies to (B) which reads: "I am (not) in favour of accepting service under the Act in its present form."

Question (C) is even more one-sided; it asks us to agree (or not) "to abide by the decision of the majority and undertake not to enter the service if the answers to part B reveal a majority against undertaking service. . . ." Not a word about agreeing to abide by the majority if it is in favour of undertaking service.

To vote on the plebiscite in its present form will surely lay us open to the criticism that our prime wish is to discredit the N.H.S. Act 1946, or, to put it crudely, to play at politics. It would be deplorable for an honourable profession to lay itself open to such a charge.

Great Hallingbury, Herts. W. W. WALTHER.

SIR,—In a very able talk recently given by a B.M.A. speaker at Newcastle, it was suggested that all those voting in favour of the National Health Service are, a priori, "blacklegs." It apparently did not occur to the speaker that this rather undemocratic suggestion does not leave members of the profession a free choice.

Many who do not agree with the B.M.A. lead would, in the case of a majority vote against the scheme, stand by their colleagues—as is right and proper in a democracy—and, in spite of their own views, not accept service under the new scheme. Surely the word blackleg is premature at this stage, and such an insinuation would prejudice a free vote.

It might also be mentioned that no effort to present any other point of view was made, but voting was proceeded with immediately after the speech of the B.M.A. representative. This speech contained no constructive criticism of the proposed Health Act.

JOSEPHINE HEBER.

A STATEMENT EXPLAINED

SIR,—My attention has been drawn in recent weeks to the anxiety caused by a report published in the *Evening News* sports edition for Monday, Oct. 27, wherein appears my comments of the treatment of an injury sustained by Macdonald Bailey, the international sportsman, at the White City on Aug. 3.

On that occasion Macdonald Bailey collapsed on the running track and was found to have injured certain muscles of the thigh. I examined Macdonald Bailey some weeks later and understood from him that the injury had not been seen by a specialist for ten weeks and that he, Macdonald Bailey, did not realise the true nature of the injury. My comments, referred to above, were based on this information. However, from information subsequently placed before me by professional colleagues who were then responsible for the care and treatment of Macdonald Bailey consequent upon receipt of this injury, it seems clear that the runner did receive on return to his Air Force unit a full medical examination by the medical officer concerned, and also within a short space by a specialist attached to the Royal Air Force Medical Service.

I now desire to make it clear that my comments were not intended to impute, to those responsible for the care and treatment of Macdonald Bailey at the material time, any lack of professional care, and if such an interpretation has been placed upon my words as reported, then I regret it.

London, W.1. C. R. WOODARD.

Parliament

THE APPOINTED DAY

AN Order in Council, made on Jan. 26, formally prescribed July 5 as the appointed day on which the National Health Service Act and the National Insurance Act will come into operation.

FROM THE PRESS GALLERY

New Birth Certificates

In the House of Lords on Jan. 20 Lord HENDERSON, replying to Lord BROUGHSHANE, said that the Births and Deaths Registration Act, 1947, had been brought into operation on Dec. 15 last. The new certificates, which omitted particulars in the full birth entry which were unnecessary for ordinary purposes, were now available either at Somerset House or from the superintendent registrar of the district in which the birth occurred. They could also be obtained from local registrars at the time of registration. They cost only 6*d*. as against 2*s*. 7*d*. or more for the full certificate, and they were proving both popular and convenient. The demand at present was about 400 a day at Somerset House alone.

Meat Ration for Farm Workers

On the motion for the adjournment in the House of Commons on Jan. 20 Mr. A. E. BALDWIN called attention to the "scandalous refusal" of the Minister of Food to recognise the claims of farm workers to an extra ration of meat. They worked, he said, harder and had a lower standard of living than any other industrial workers. To give them 1 lb. of meat extra a week would cost about £2 million a year, and the meat thus used could be saved from the allocation to canteens, hotels, and restaurants. Dr. EDITH SUMMERSKILL, parliamentary secretary to the Ministry, said it was an exaggeration to say that our agricultural workers had a lower standard of living than any other industrial workers. To give extra meat to farm workers would lead to a similar demand from steel workers and others. The weekly ration of meat at present for the ordinary domestic consumer was 1*s*. worth. During this year the Ministry might have to issue 2*d*. worth as canned corned meat for part of the year. If the meat ration for agricultural workers were doubled the civilian ration would have to contain corned beef for an extra six weeks. Only in December the advisory committee of the T.U.C. had decided not to recommend extra meat rations for farm and other workers, recognising that if these claims were accepted a serious cut would have to be made in the rations for the rest of the community.

QUESTION TIME

How Many Patients

Sir E. GRAHAM-LITTLE asked the Minister of Health whether he was aware that the average number of panel patients on an individual doctor's list under the National Health Insurance scheme was 1000 and the regulation limit 2500; that his proposal circulated to all medical practitioners that the number of patients allowed to one doctor under the new Act might be expanded to 4000, while he was also allowed to take private practice, would make it impossible to give any proper attention to patients; what consultations he had before making this proposal; and whether he would now reconsider it?—Mr. A. BEVAN replied: The existing figures quoted do not include dependants of insured people or private practice. The figure of 4000 was agreed with the profession's Negotiating Committee.

Insurance Contributions and Health Service

Sir E. GRAHAM-LITTLE asked the Minister of National Insurance if he would not give an estimate of the average total per week of the compulsory levy made under the National Insurance Act, 1946, on each insured person in respect of insurance, and of Health Services, and of any other costs incidental to the working of these two Acts.—Mr. JAMES GRIFFITHS replied: It is estimated that the total yield of the contributions payable by insured persons and employers under the National Insurance Act, 1946, will be about £7 million a week and that out of this amount about £700,000 will be allocated to the National Health Service.

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Rations in Prisons

Replying to a question, Mr. C. EDE said that the scale of rationed foods for prisoners was the same as for the general public, but a special arrangement as regards potatoes had been found necessary to prevent the calorific value of prison diets falling so much below the average for the rest of the population as to become insufficient. After consultation with the Ministry of Food it had been arranged that for prisoners the allowance of potatoes should be 14 oz. a day. With this allowance the over-all value of the diets for prisoners, of whom 80% are males engaged on manual labour, approximated to the average for the whole population but was less than the value of the diet of an ordinary male industrial worker.

Colonial Registration

Mr. R. W. SORENSEN asked the Secretary of State for the Colonies to what extent or under what circumstances colonial medical practitioners trained in the U.S.A. and Canada could not practise in British Colonies; and what action he would take to ensure that they should be entitled to practise provided their training and qualifications were equated to British standards.—Mr. D. R. REES-WILLIAMS replied: Most Colonies follow the practice of the General Medical Council of the United Kingdom with regard to the registration of qualifications obtained in the U.S.A. and Canada. Certain Canadian qualifications are registrable by the General Medical Council, but there is no reciprocity between the U.S.A. and the United Kingdom and no U.S.A. qualifications are registrable. There is provision in the legislation of some Colonies for the registration of qualifications other than those registrable by the G.M.C. The Minister knows of no reason why Colonial governments generally should not continue to follow the practice of the G.M.C., but he is considering, in consultation with the governments concerned, the possibility of special temporary arrangements being made to permit the registration of doctors who, because of the war, studied in North America instead of in the United Kingdom, provided that their qualifications are satisfactory.

Mr. SORENSEN: Surely, in view of the scarcity of qualified medical men in the Colonies, it is unfair to advance the plea of no reciprocity as an excuse for not allowing some of these men who could practise in the Colonies to do so?—Mr. REES-WILLIAMS: It is a question of protection of the public, and we consider that it is quite as important for the public in the Colonies to be protected as it is that the public in this country should be protected. A doctor may have the same qualifications, broadly speaking, to practise in the Colonies as he has to practise here.

Currency for Treatment Abroad

Sir WALDRON SMITHERS asked the Minister if he was aware that British tuberculous patients in sanatoria abroad were required to submit two doctors' certificates, a full-size X-ray plate, and 4 guineas every three months in order to apply for funds to continue their treatment; and as this constituted a burden on patients abroad, if he would make arrangements to refund the 4 guineas to applicants whose X rays showed serious illness and to those whose applications had been granted.—Mr. BEVAN replied: I am not aware of these difficulties, but I will look into the position.

Blood-transfusion Service

Replying to a question, Mr. BEVAN stated that in the first three-quarters of 1947 the estimated effective strength of donor panels had risen from 267,000 to 369,000 and the response of donors to calls from 36% to 41%. Enough blood was being obtained, but to reach our aim of not calling on donors more than twice a year 163,000 more were needed.

A leading article in the February issue of the *Practitioner* says: "The present deadlock between the Minister of Health and the doctors arises . . . not from a difference of principle but of administration. The Minister is thinking, and is bound to think, of his responsibilities to Parliament, the doctors of their patients. . . . It is a conflict of responsibilities. Solution lies in agreement that the doctor must be secured in the prestige of independence, that the Minister shall not be required to answer for faults in the service which he has no power to remove. As both are essential to the success of the scheme, and to justice, a solution should not be far off. The difference between the Minister and the British Medical Association can be bridged in an atmosphere of goodwill. The time for amendment is *now*."

Public Health

Births and Deaths in 1947

THE Registrar-General for England and Wales announces[1] that in the fourth quarter of 1947 there were 17·8 live births per 1000 population and 23·4 still-births per 1000 total births; in the same quarter there were 11·0 deaths per 1000 population. Figures for the whole year 1947, with comparable figures for 1946 and 1938, are as follows:

	Live births		Stillbirths		Deaths	
	Total	Per 1000 population	Total	Per 1000 live and still births	Total	Per 1000 population
1947	886,633	20·5	21,827	24·0	517,622	12·0
1946	819,894	19·1	22,915	27·2	492,088	11·5
1938	621,204	15·1	24,729	38·3	478,996	11·6

The 1947 birth-rate was the highest since 1921; the rate reached a peak of 22·8 in the March quarter after rising steadily since the end of the war.

Poliomyelitis and Polioencephalitis

In the week ended Jan. 17 notifications of poliomyelitis numbered 47 (52) and of polioencephalitis 2 (6). Figures for the previous week are shown in parentheses. The fall in notifications is slow, and the figures are very high for this time of the year.

Cholera in the Middle East

Egypt.—The epidemic began on Sept. 22 when 7 cases were reported from villages of the Sharqiya Province on the eastern border of the Nile delta. The outbreak came to an end on Dec. 31 when 1 case was notified—in a nurse at the Kasr el Aini Hospital, Cairo. Between these two dates all governorates and provinces in Lower Egypt were involved, and all provinces in Upper Egypt, except Aswan. Thanks to efficient measures by the Egyptian public-health authorities, infection did not reach Upper Egypt till Oct. 17, and the number of cases was fairly small in this part of the country except in the Faiyûm which was the last province to become infected; here over 500 cases were notified. This province derives its water-supply partly from a piped, filtered, chlorinated system, and partly from shallow wells; in the areas with a piped supply the incidence was 36·5 per 100,000, while in the areas with a well supply the rate was 159 per 100,000.

In the 101 days of the epidemic there were in all 20,805 cases and 10,276 deaths; the peak was reached on Oct. 20 with 1022 cases and 581 deaths. (During the 1902 epidemic the greatest number of cases in a single day was 1400; altogether there were 40,000 cases and 34,000 deaths.) The latest outbreak resembles previous ones in Egypt in the steep ascent of the epidemic curve to a maximum of 5976 cases in the fourth week of October and its equally rapid decline to 52 cases in the fourth week of November; in the month of December only 34 cases were reported.

Among the steps taken to control the spread of infection was mass vaccination of Egypt's population of nearly 20 million, which was completed on Nov. 12; this was the first time that all the inhabitants of a country had been protected in this way. Revaccination of the whole population will begin in February. So far no cases of cholera have been reported this year. The ports of Alexandria, Port Said, Ismailia, and Suez, and all provinces in Upper Egypt were declared free from cholera on Jan. 21.

Syria.—On Dec. 20, when the disease had almost disappeared from Egypt, 7 confirmed cases of cholera were reported from two neighbouring villages in the Hauran Province of Syria; and between Dec. 21 and 28 infection spread to three further villages in the same province. All five villages were on or near the main Dera-Damascus road. The final totals for the out-

1. Registrar-General's Return of Births and Deaths for the week ended Jan. 17. H.M. Stationery Office. 6*d*.

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break were 45 cases and 18 deaths. No cases have been notified since Dec. 28, and on Jan. 17 Syria was declared free from cholera. The origin of the outbreak is still uncertain.

Anti-cholera measures included immediate vaccination of all inhabitants of the infected villages, the placing of a sanitary cordon round each infected village, and mass vaccination of the Syrian population. Inasmuch as Damascus, the capital, was close to one of the infected villages, mass vaccination began there on Dec. 20; and so energetically was the campaign pursued that by Dec. 30 vaccination was completed in the whole region of Southern Syria between its Palestine and Transjordan boundaries and Homs; and it was expected that by Jan. 6 the whole population would be vaccinated. To help in this endeavour, Egypt provided 2,500,000 doses out of her reserve of 25 million.

Obituary

JAMES RICHARDSON ANDREW CLARK

BT., C.B., C.M.G., F.R.C.S.E.

Sir James Clark, who died at his home at Maidenhead on Jan. 18 at the age of 95, succeeded in 1893, as second baronet, his father, Sir Andrew Clark, a former president of the Royal College of Physicians. He was educated at University College School, and University College, London, taking the Conjoint qualification from the London Hospital in 1878 and the Edinburgh fellowship ten years later. In 1886 he took the D.P.H. at Cambridge and he later became a vice-president of the Royal Institute of Public Health. Clark had chosen military medicine as his career, and in 1900 he was in charge of the Edinburgh Hospital in South Africa. Two years later he was appointed C.B. for his services, and in 1916 C.M.G. He retired from the R.A.M.C. with the rank of major, later becoming lieut.-colonel commanding the R.A.M.C. militia, and he was a bailiff grand cross of the Order of St. John of Jerusalem. In 1893 he married Miss Lilian Hopkins, who survived him by only five days. Their only son, Brigadier E. A. Clark, K.C., succeeds to the baronetcy.

FRANK HARRIS WHITE

M.R.C.S., D.P.H.

Dr. F. H. White, who died on Jan. 2 at the age of 75, had been for seventeen years medical officer to the Port of London Authority. After qualifying from the London Hospital in 1897 he had many years of industrial experience in the East End of London, serving for fourteen years as medical officer to Poplar workhouse, and for five years as relief deputy medical officer. During the 1914–18 war he served in France as medical officer to the 17th County of London Battalion (Poplar and Stepney Rifles), and in the late war, with the rank of lieut.-colonel, he was medical officer to the P.L.A. sector of the Home Guard.

"White's sense of duty," writes a P.L.A. colleague of his last strenuous years, "was so great that he considered that the medical officer should remain at his post during the whole of the hostilities. In spite of his age he carried out this duty conscientiously throughout the war. He was present when the building was hit by a 1000 kg. bomb, and later, when lesser bombs fell and fire raids took place in the neighbourhood, no matter what time of the night, he gave his help to all who needed it. His ashes were scattered on Jan. 14 in the middle of the tideway in the Lower Pool of London."

CHARLES AINSWORTH MITCHELL

M.A., D.SC. OXFD, F.R.I.C.

Dr. Ainsworth Mitchell, editor of the *Analyst* from 1920 to 1945 and a former president of the Medico-Legal Society, died on Jan. 5. The third son of a Norfolk doctor, T. R. Mitchell of Thetford, he was born in 1867, educated at King William's College, Isle of Man, and at Exeter College, Oxford, where he graduated M.A. in 1889. He was at that time a competent footballer and played half-back for his college.

After a period at King's College, London, and at Heidelberg, Mitchell became assistant to Otto Hehner, the consultant chemist, and later chemist to Beaufoy & Co., vinegar brewers. From this time he devoted himself to chemical research in medicolegal and forensic matters connected with fingerprints, handwriting, inks, forgery, documents, and the chemistry of oils and fats. He was the author not only of about forty original memoirs on these subjects, but also of about thirty textbooks which he either wrote, translated, or edited. As an expert witness in criminal cases he was an example of how evidence should be given fairly and clearly; his advice was much sought by the authorities in many cases including spy trials during the 1914–18 war, forgeries, will disputes, poison-pen letters, and questions of personal identity. His last published book *A Scientist in the Criminal Courts* (1945) contains an account of some of the more interesting *causes célèbres* in which he was engaged. He was a vice-president of the Medico-Legal Society of France and of the Royal Institute of Chemistry, on whose council he also served. In 1929 his many scientific investigations were recognised by the award of the degree of D.SC.

A genial and kindly man, a delightful and versatile companion and a warm friend, Mitchell was always alert to help a colleague. He married Miss Edith Boyle Keely, an artist of distinction and a descendant of Robert Boyle.

H. E. C.

Appointments

MAGNUS, H. A., M.D. Lond.: director, pathology department, King's College Hospital medical school.

WILSON, H. T. H., M.A., M.B. Camb., M.R.C.P., D.T.M.: physician for diseases of the skin, Royal Northern Hospital, London.

City General Hospital, Leicester

DICKIE, JOHNSTONE, D.S.C., M.B. Edin., M.CH. ORTH. Lpool, F.R.C.S.E.: chief assistant, orthopædic department.

JOHNSON, B. D. L., M.R.C.S., D.A.: anæsthetist.

SMITH, B. J., M.B. Glasg.: asst. pathologist.

Births, Marriages, and Deaths

BIRTHS

ATKINSON.—On Jan. 18, the wife of Mr. W. J. Atkinson, F.R.C.S.—a son.

BAWTREE.—On Jan. 18, the wife of Mr. D. W. Bawtree, F.R.C.S.—a daughter.

COMPSTON.—On Jan 23, in London, the wife of Dr. Nigel Compston—a son.

DE SOLDENHOFF.—On Jan. 17, at Irvine, Ayrshire, the wife of Dr. Richard de Soldenhoff—a son.

HAIRE.—On Jan. 17, the wife of Dr. I. R. Haire—a daughter.

HANDFORTH.—On Dec. 12, at Hong-Kong, the wife of Dr. J. R. Handforth—a son.

HAWKINS.—On Jan. 18, in London, the wife of Dr. P. S. Hawkins—a daughter.

HOUGHTON.—On Jan. 17, the wife of Mr. L. W. Houghton, F.R.C.S.—a son.

PROCTOR.—On Jan. 14, at Perth, the wife of Dr. H. Proctor—a son.

SCRIVEN.—On Jan. 22, at Farnham, the wife of Lieut.-Colonel W. H. Scriven, M.B.E., R.A.M.C.—a son.

STEVENS.—On Jan. 21, in London, the wife of Dr. A. V. Stevens, O.B.E., M.C.—a daughter.

WARREN.—On Jan. 19, the wife of Dr. H. B. S. Warren—a daughter.

MARRIAGES

CUTLER—STANHOPE.—On Jan. 24, at Hastings, Michael Cutler, M.B., to Audrey Stanhope.

FORDE—TERRY.—On Jan. 24, in London, Daryll Forde, PH.D., to Evelyn Terry, M.R.C.S.

SWEETNAM—HERRICK.—On Dec. 16, at Kingston, Jamaica, Michael Thorp Sweetnam, M.R.C.S., captain, R.A.M.C., to Myra Elizabeth Herrick.

DEATHS

BEESLEY.—On Jan. 16, at Exmouth, Clarence Beesley, L.R.C.P.E., D.P.H.

CLARK.—On Jan. 18, at Maidenhead, Sir James Richardson Andrew Clark, Bt., C.B., C.M.G., F.R.C.S.E., D.P.H., colonel, R.A.M.C. retd., aged 95.

DUNCAN.—On Jan. 18, in Manchester, Helen Winifred Duncan, B.A. Lpool, M.D. Lond., M.R.C.P.

FERGUSON.—On Jan. 22, at Dunedin, New Zealand, Sir Henry Lindo Ferguson, Kt., C.M.G., M.D. Dubl., F.R.C.S.I., aged 90.

GRAHAM-BISSELL.—On Jan. 23, at Inverness, Frederick Edward Graham-Bissell, lieut.-colonel, R.A.M.C. retd.

JONES.—On Jan. 9, at Prestwick, Arnold Ernest Jones, M.B. Glasg.

LEWYS-LLOYD.—On Jan. 12, Evan Lewys-Lloyd, M.R.C.S., D.P.H., aged 75.

LLOYD.—On Jan. 22, in Birmingham, Bertram Arthur Lloyd, M.B. Lond., CH.M. Birm., F.R.C.S.

MAUNSELL.—On Jan. 18, in London, Debonnaire Frederick Maunsell, M.R.C.S.

STAINER.—On Jan. 23, at Lee Common, Bucks, Edward Stainer, M.A., D.M. Oxfd, F.R.C.P., aged 78.

WRIGHT.—On Jan. 22, at Bembridge, Dudley d'Auvergne Wright, F.R.C.S., aged 80.

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Notes and News

ECONOMIC ASPECTS OF TOBACCO ADDICTION

At a meeting of the Society for the Study of Addiction on Jan. 20 Mr. ZACHARY COPE, F.R.C.S., said that tobacco had already achieved an economic status in 1492, when Columbus discovered it in use among the American Indians. The earliest reference to it mentioned the leaves as being bartered for other commodities. By 1523 a tobacco trade had been established in Portugal. Even the calumet, or pipe of peace, was of economic and political importance. The area in which the red stone was mined for making these pipes became sacred, to enable the manufacture of pipes to continue during war, and afforded sanctuary to refugees. Smoking had become so well established in England by 1560 (nearly all the tobacco coming from the West Indies through Spain) that Queen Elizabeth was able to put a duty of 2*d.* on each lb. Virginia was first successfully colonised in 1607. No money was allowed to be exported from England thither; so the colonists adopted the Indian practice of using tobacco as currency. At first they acquired the tobacco from the Indians, but John Rolfe, who married Pocahontas, started to grow his own tobacco; and soon all the colonists were doing so (manufacturing their own money) to such an extent that a law was passed that no-one should plant tobacco before he had planted 2 acres of corn. By 1639 Virginia produced 1,500,000 lb. of tobacco annually.

This industry had inevitable repercussions on the labour market. When the tobacco farms grew too large for the colonists to manage, they imported indentured apprentices from England; but this made them have to change each employee every five years, which was inconvenient. So black slaves were imported from West Africa, and the tobacco and slave trades rose and flourished together. About 1800 the cotton trade joined these two and detracted somewhat from the tobacco trade. But in 1849 was discovered the light yellow leaf which became so popular that tobacco production was doubled in ten years, becoming indeed of really tremendous economic importance. Next the American civil war crippled the industry by destroying the tobacco farms and liberating the slaves; and recovery was slow. Finally came the war of 1939–45, during which the yearly output of tobacco rose from 1,400,000,000 lb. to 2,300,000,000 lb.

So much for Virginia. What about England? It is said that as early as 1614 there were 7000 shops in London at which tobacco could be bought. King James, author of the famous *Counterblast to Tobacco*, put on an additional tax of 6*s.* 8*d.* a lb. This led the English to emulate John Rolfe and grow their own tobacco, especially in Gloucestershire. Naturally this interfered with the Virginian trade, and the planters protested that their livelihood was being taken from them. So tobacco-growing was banned in England. Troops were used to ferret out the plantations, and a special officer was appointed to suppress them. But it took seventy years to stamp out the practice. The trade with Virginia was used as a cradle for the Royal Navy. By the Navigation Act of 1651 all goods from the colony had to be shipped in either English or colonial ships. A few years later there were 100 vessels engaged in this trade; and on one occasion 300 vessels sailed with the year's crop of tobacco.

At present the annual consumption of tobacco is 5 lb. per caput in the United Kingdom, and 7 lb. in the U.S.A. The tax of 54*s.* 10*d.* a lb. in the U.K. now represents an annual tax of £10 per caput of the entire population, or £20 per caput of all adults. The world's production of tobacco is now 7,000,000,000 lb., or 2 lb. per caput of its population. And the wheel has come full circle as regards the use of tobacco as currency, for everyone knows that 200 cigarettes were equivalent to £30–50 in occupied Germany after the war. The difference between the cost price (1*s.* 2*d.* a lb.) of tobacco in the U.S.A. and the selling price (£3 a lb.) in the U.K. is an enormous incentive to smuggling.

Mr. Cope did not touch on the allied economics of the timber trade (matches) or of the manufacture of pipes, pouches, cigarette boxes and cases, lighters and the supply of petrol and flints for them, and advertising. He stated, however, that he had been unable to find a single book, pamphlet, or even paper on the economics of tobacco in the large library of the London School of Economics. It therefore appears that Mr. Cope has launched this subject.

FREDERICK BANTING

FROM his earliest years Frederick Banting [1] seems to have been something of an *enfant terrible*, but, thanks perhaps to his Scottish mother and his austere Methodist father, he retained a high ethical code through all the vicissitudes of his too short life. His decision to renounce a clerical career and to take up medicine was the turning-point of that life. He was built for physical endurance, or he could not have accomplished what he did. He was not an easy man to know or to work with, but his relationship with Dr. Best, his junior collaborator in the discovery of insulin, was a happy example of his loyalty to colleagues. He could, on the other hand, be a "good hater," and both sensitive and suspicious. Impatient by temperament, he had a dogged perseverance which was the salvation of his work; but he was handicapped by lack of training in research, and he could not have made a practical and usable insulin extract without assistance. Fortunately, his faith was unshakable, and in spite of frustration, failures, and delays he pressed on to a success which meant the saving of countless lives. His work on insulin was not complete when war broke out in 1914 and he went away to serve in the Canadian army. He was seriously wounded and it was long before he was persuaded to return to his peace-time task. In 1921 he achieved his aim, and gave insulin to the world. Afterwards he spent some time travelling, and Dr. Stevenson furnishes many happy details of these journeys. Fame had now come and honours were heaped on him by learned societies of many countries. But the storm clouds were again gathering in Europe and in the recent war he worked strenuously in the interests of aviation and met his death on an experimental journey in the snowy wastes of Newfoundland.

Dr. Stevenson is to be congratulated on a vivid and intimate picture of Banting's life and work.

A NEW JOURNAL FOR CYPRUS

IF Hippocrates could glance through the first issue of the *Cyprus Medical Journal* he would find plenty to interest him, for many of the articles are printed in Greek, and others are duplicated in Greek and English. The journal has been founded, as Dr. Horace Shelley explains in his first editorial, to supply the medical profession in Cyprus with articles on all branches of their work, and to encourage experienced doctors to put their knowledge on paper for the benefit of others. Non-political and non-partisan, the new journal will publish no articles likely to cause political discussion; but medical articles in Greek, Turkish, or English are invited: "If you have data and material which might prove of value to your colleagues; if you have silently been pursuing some investigation or research; if you have a record of some interesting disease, permit your enthusiasm to have play." The first issue includes a note by Sir Arthur Hall on the parkinsonian syndrome seen after epidemic encephalitis lethargica; and this is given both in English and in Greek. Most of the articles are provided with summaries in the other language.

University of Oxford

Dr. A. D. Gardner has been appointed regius professor of medicine in succession to Dr. Arthur Ellis, who retires at the end of July.

Dr. Gardner, who is 63 years of age, was educated at Oxford University and St. Thomas's Hospital. He graduated B.M. in 1911, and the following year he took his F.R.C.S. From 1914 to 1917 he held a Radcliffe travelling fellowship and he was awarded the Radcliffe prize for medical research in 1923. Dr. Gardner held the posts of demonstrator in morbid anatomy and research assistant at Thomas's. In 1915 he was appointed bacteriologist in charge of the M.R.C. Standards Laboratory at Oxford, later becoming director. In 1936 he was elected reader in bacteriology in the university with the personal title of professor, and he is a fellow of University College, Oxford. He is the author of *Bacteriology for Medical Students* and of *Microbes and Ultramicrobes*, and in 1929 he contributed the section on the dysentery group of bacilli to the M.R.C. *System of Bacteriology*. In 1932 he described the cough-droplet method of early diagnosis of whooping-cough, and during the late war, with Chain and Florey, he was a member of the Oxford team working on penicillin as a therapeutic agent. He has also made a special study of leptospirosis, on which he has published important papers. He is a member of the Army Pathology Advisory Committee and of the Oxford regional hospital board.

King's College Hospital

On Feb. 1 Mr. Harold Edwards will succeed Mr. Terence Cawthorne as dean of the medical school.

1. Sir Frederick Banting. By LLOYD STEVENSON, M.D. London: Heinemann Medical Books. 1947. Pp. 446. 25*s.*

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Kent Pædiatric Society

A meeting of this society will be held at 11 A.M. on Saturday, Feb. 14, at the County Hospital, Farnborough, when Dr. D. G. Madigan, Mr. J. H. Mayer, and Dr. R. Cruickshank will open a discussion on Tuberculosis in Childhood.

Chadwick Lecture

The date of Dr. René Sand's Chadwick lecture was incorrectly given in our issue of Jan. 10. Dr. Sand will speak, on How Medicine Became Social, on Tuesday, Feb. 17, at 2.30 P.M., at 26, Portland Place, London, W.1.

Royal Society

On Thursday, Feb. 5, the society will meet at the Wellcome Research Institution, Euston Road, London, N.W.1, at 4.30 P.M., when Dr. C. H. Kellaway, F.R.S., the director-in-chief, will give a lecture on the scope and activities of the institution.

British Overseas Airways Corporation

Air-Marshal Sir Harold Whittingham has been appointed director of medical services of the corporation in succession to Air Vice-Marshal Sir William Tyrrell, who has retired. Since his retirement from the Royal Air Force in 1946 Sir Harold has been medical adviser to the British Red Cross Society.

Paddington Medical Society

This society is holding two meetings in connexion with the plebiscite on the National Health Service Act. Dr. Alfred Welply, secretary of the Medical Practitioners' Union, will attend the first on Feb. 3, and Dr. A. Macrae, an assistant secretary of the British Medical Association, will be present at the second on Feb. 10. Both meetings will take place at 8.45 P.M. at St. Mary's Hospital, Paddington, W.2.

Royal Medical Foundation of Epsom College

Morgan Annuity.—In May, an annuity of £34 will be awarded to a spinster daughter of a registered medical practitioner. Candidates must not be less than 65 years of age, and their annual income must not exceed £120, irrespective of help from the Royal Medical Benevolent Fund. Forms of application may be had from the secretary's office, Epsom College, Surrey, and must be returned by April 17.

British Association of Plastic Surgeons

The following officers have been elected: president, Prof. T. Pomfret Kilner; vice-president, Sir Archibald McIndoe; treasurer, Mr. R. P. Osborne; and secretary, Mr. J. N. Barron. The association is sponsoring the *British Journal of Plastic Surgery* which will appear quarterly, as from March of this year, under the editorship of Mr. A. B. Wallace. The secretary of the association may be addressed at 45, Lincoln's Inn Fields, London, W.C.2.

Resolutions on the Act

At a meeting of the council of the Royal College of Surgeons of England, held on Jan. 22, with Sir Alfred Webb-Johnson, the president, in the chair, the following resolution was passed:

The council, while believing that every member of the profession must act according to his conscience in deciding whether to accept service under the National Health Service Act, is of opinion that fellows and members of the college should do all in their power to maintain the unity of the profession in its endeavour to attain the highest ideals of service.

The London Hospital medical council has unanimously passed the following resolutions:

That in the view of this council no step which leads towards whole-time State salaried medical service would be in the best interests of the community.

That in the opinion of this council consultants and specialists should not take service under the new Health Act until agreement has been reached with the profession as a whole.

A meeting of 40 doctors held at Chichester on Jan. 7 showed a willingness to take part in the service provided that one or two clauses in the Act to which the profession takes exception could be removed or altered. The two chief points of disagreement were the lack of the right of appeal to a court of law against the decision of the Minister of Health, and the payment of a basic salary to any except young practitioners entering the service.

At a meeting of the medical staff of St. George's Hospital on Jan. 26, disapproval of the Health Service Act in its present form was expressed by 28 votes to 1. By a vote of 25 to 4 it was agreed to abide by the decision of the majority in the forthcoming plebiscite.

Conference for Matrons

On Feb. 2, 3, and 4 the Royal College of Nursing is holding a conference for matrons and senior administrators in public-health and industrial fields to discuss administration and human relations. Further information may be had from the secretary at the college, Henrietta Place, Cavendish Square, London, W.1, where the conference will be held.

British Electricity Authority

Dr. Peter Pringle has been appointed chief medical officer to the authority.

Dr. Pringle, who is 40 years of age, took the Conjoint qualification from King's College Hospital in 1931, and his LL.B. Lond. six years later. In 1944 he became a barrister-at-law of the Middle Temple. Since 1937 he has been employed as whole-time medical officer to Standard Telephones & Cables Ltd., and he has also held the position of appointed surgeon to the New Southgate factory since 1939. Secretary to the Association of Industrial Medical Officers, he is also a member of the medical advisory committee of the Industrial Welfare Society. Dr. Pringle obtained the D.I.H. last year. He has made a special study of selenium as an industrial hazard.

W.H.O. Interim Commission

The fifth session of the World Health Organisation Interim Commission opened at Geneva on Jan. 22 and will continue until Feb. 7. Among matters under consideration are preparation for the permanent World Health Organisation, Interim Commission technical operations, and relations of the Interim Commission with other international organisations. The W.H.O. constitution has been ratified by Egypt and Turkey, bringing the total number of States which have accepted the constitution to 26—19 of them members of the United Nations and 7 non-members.

Medical Aid for the Punjab

Colonel W. Lawie is to be in charge of the first Red Cross hospital for the relief of refugees in the Punjab, which is to be set up at Multan. A medical officer, registrar, matron, and three nursing sisters have been appointed, and it is hoped that equipment will be shipped from this country by the end of January. There are also to be subsidiary hospitals at Lyallpur and Mianwali, with two or three mobile dispensaries and medical and clothing stores. Nearly £50,000 has already been received, but funds are needed to extend the work before the hot weather, when it is feared epidemics may break out. Donations should be sent to (I & P), British Red Cross Society, 14, Grosvenor Crescent, London, S.W.1.

Diary of the Week

FEB. 1 TO 7

Monday, 2nd

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Lord Moran: Pain.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. A. W. Badenoch: Congenital Obstruction at the Bladder Neck. (Hunterian lecture.)
ROYAL SOCIETY OF ARTS, John Adam Street, W.C.2
4.30 P.M. Prof. A. C. Frazer: Metabolism of Fats. (Cantor lecture.)

Tuesday, 3rd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. W. Russell Brain: Exophthalmos.
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. A. D. Beattie: Treatment of Peptic Ulcer by Vagotomy. (Hunterian lecture.)
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pathological demonstrations.

Wednesday, 4th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Denis Browne: Hare-lip and Cleft Palate. (Hunterian lecture.)
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (7, Drumsheugh Gardens.) Prof. R. W. B. Ellis: Problems of the Newborn.

Thursday, 5th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. T. C. Hunt: Peptic Ulcer.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. L. Forman: Seborrhœic Dermatoses.

Friday, 6th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. G. E. Beaumont: Tumours and Cysts of the Chest. (First lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. R. G. Pulvertaft: Repair of Tendon Injuries in the Hand. (Hunterian lecture.)
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. K. F. W. Hinson: Laboratory Diagnosis of Bronchial Biopsies.

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THE COUNTRY DOCTOR*

WILLIAM N. PICKLES
M.D. Lond., M.R.C.P.
MEDICAL OFFICER OF HEALTH, AYSGARTH RURAL DISTRICT

AMONG country doctors of the past, Edward Jenner comes into my mind first, because he illustrates so aptly the attention one must pay to country beliefs. "I can't get smallpox," said Jenner's milkmaid, in the pride of her youthful beauty and no doubt with a toss of her saucy head, "I've had cowpox." Country minds work on direct lines, and the old lady selling her dropsy cure, which William Withering adopted, had no doubt that it was a dropsy cure and it is still a dropsy cure after the lapse of nearly two centuries. Then there was Francis Adams of Banchory, who besides becoming a physician of note accomplished a remarkable scholastic feat in the first complete translation of Hippocrates. I like to dwell on the picture of this country doctor, who, after long hours in the saddle, used to retire to bed and eat a large dinner in comfort and then, surrounded by books, would work at this self-appointed task till he dropped off to sleep in the early hours of the morning.

The doctor in country practice cannot help taking a real personal interest in his patients; he enters into their joys and sorrows, and is well versed in all the small details which go to build up their relatively simple existence. One patient of mine pleased me very much in saying that we country doctors looked on our patients as members of our own large family.

A personal knowledge of one's patient and his family is of immense value in medicine, and there is continuity in country practice. Most of us show little inclination to change our habitat and retire with reluctance, knowing that our real life is then ended and fearing that utter loneliness which comes with a separation from our work and from our friends. Certainly, Diocletian threw aside the purple and spent his days growing cabbages, but this or like pursuits would appeal to few of us in exchange for the full life we have led. My own patients, Yorkshire dalesfolk, have shrewdness and ability and kind hearts behind a somewhat crusted exterior and are just the people to help their doctor in his investigations. Matters so delicate as heredity and consanguinity have to be approached with care, but I find my patients slow to take offence.

COMMON AILMENTS

I myself have seen much of endemic goitre in the past, but I cannot explain why it has practically disappeared. Fresh fish has always been a problem in these parts and possibly additions to our diet from the village shop, such as tinned sardines, pilchards, and herrings, despised in our fathers' time, have supplied the necessary factor to the modern generation.

Quite properly attention has been drawn to poverty, malnutrition, and bad housing as causative factors in the rheumatic diseases, but let us remember that there is a strong hereditary factor, obvious to the family doctor in the country. It was a very large and probably the only factor in a remarkable family I have had under my notice for thirty years, for, having been deservedly prosperous, its members were probably better housed and fed than their non-rheumatic neighbours. Of the 53 descendants of a man who died before my time, himself a victim, 23 have had rheumatic fever or definite signs of mitral stenosis.

Two conditions are a perpetual reproach to me. The first is dental caries, which should not occur in a district where the health and welfare of every child is a matter of concern to its parents; but we do not know how to prevent it. Lady Mellanby has given us new hope in the improved dentition of London school-children, and I have an impression, verified by this authority, that the same improvement is taking place in Wensleydale. The second is glandular tuberculosis. A young Harvard physician visited our children's sanatorium a few years ago and I was able to show him several children with tuberculous glands of the neck. With mixed feelings, I discovered that he himself was observing such conditions for the first time; the United States have found the obvious means of preventing them, which our country has neglected.

NATURAL HISTORY OF INFECTIOUS DISEASE

Turning to the problems of epidemiology, which a country doctor is specially well placed to study, I should like to quote two men, a Devonian and a Dane, almost contemporaries. William Budd wrote:

> "It is obvious that the formation of just opinions on the question how diseases spread may depend less on personal ability than on the opportunities for its determination which may fall to the lot of the observer. It is equally obvious that where the question at issue is the propagation of diseases by human intercourse, rural districts, where the population is thin and the lines of intercourse few and easily traced, offer opportunities for its settlement which are not met with in the crowded haunts of large towns."

Budd's fame was founded on his discovery of the communicability of typhoid fever, achieved as a country practitioner.

Panum the Dane, sent as a youngster to the Faroe Islands to investigate a measles epidemic, wrote similarly:

> "The isolated situation of the villages and their limited intercourse with each other made it possible in most cases to ascertain where and when the person who fell ill had been exposed to infection and to prove that the contagion could not have affected him either before or after the date stated."

Country districts in Britain even now present these advantages, and country practitioners should still grasp their opportunities. That short and only possible exposure is so valuable and is not difficult to discover, when the doctor knows every man, woman, and child in his area and when they live in villages and isolated farms.

In Wensleydale I have evolved my own method of charting infectious disease. I keep quarterly charts on graph-paper, the dates are written at the top of this and the names of the villages, divided into eight groups, at the left-hand side (see figure). Each disease is given distinct coloured squares, each of which, representing a sufferer from this particular disease, appears on the chart in a line beneath the date of commencement and opposite the village in which it occurred. Below are some of the instances drawn from the charts.

(1) A school-mistress returning from her Christmas holidays spent with her relatives, though feeling ill attended school for one brief morning session. In the afternoon she was quite unable to return, but the damage was already done and she was the origin of an epidemic of influenza, commencing two days later and comprising 78 victims.

(2) A little boy was taken to the pantomime in Leeds on Feb. 15. On Feb. 27 he fell ill with measles, but not severely enough to prevent him attending school on the 28th and on March 1 and 2. Of 24 victims, 10 commenced on March 11, 5 on the 12th, 6 on the 13th, and 3 on the 14th. A second wave began on the 21st and consisted of 11 sufferers—all the non-immunes exposed to risk.

(3) On May 6, 1937, I was called into a house to see a young married woman suffering from shingles, and on the 7th I saw a young farmer with the same complaint in a village four miles distant. I found that they had an experience in common. They attended a sale at this latter village and the woman, being a friend of the farmer's wife, had tea with the family. It is probable that the infecting patient was present at one or other of these functions, but all efforts to discover the individual failed. May 12 in that year being a day of national rejoicing—our King's Coronation—the

* Finlayson lecture, delivered at the Royal Faculty of Physicians and Surgeons, Glasgow, on Nov. 13, 1946.

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male sufferer was present at the village celebrations, which took the form of sports and the inevitable tea. On the 26th and 27th the first 2 sufferers from chickenpox sickened, followed in due course by 7 others. One old man developed shingles, obviously from infection by his grandchildren.

(4) This episode has been repeated many times, but I am tempted to include it as it gives the incubation period of infectious jaundice.

In 1929 there were 5 entries of infectious jaundice and 5 only in the week Sept. 24 to Oct. 1, and I found each of these people had attended a village fête on Aug. 28. After a long search I discovered that a girl whom I had actually seen on the morning of the fête and never dreamt would feel equal to festivities had also been present. As she spent the afternoon with her girl friend, one of the victims, and was in the house of another, I think it was fair to conclude that she was the culprit.

This girl friend's victims in her own village numbered 4, occurring at the end of October and the beginning of November, and contact was easily proved in 3 of them. In the fourth, a rather pathetic little middle-aged man (since dead of a tuberculous kidney), it was not clear as he denied all acquaintance with this girl. Finally, his sister gave him away shamelessly. "Not know Margaret? Why he's very fond of her: he goes and helps her to wash-up every evening!" Our little man might have said with Samson: "If ye had not plowed with my heifer, ye would not have found out my riddle." The tell-tale sister herself fell a victim a month later and the original girl had 13 victims to her discredit.

The following list shows that the charting of all infectious disease in a practice serving about 3230 people is rather a formidable task.

Sufferers from Infectious Diseases in 15 1/4 years in Wensleydale (population 3230)

Influenza	1112	Zoster	140
"D. and V."	1018	Hepatitis	122
Measles	510	Scarlet fever	117
Febrile catarrh	407	Lobar pneumonia	41
Varicella	318	Glandular fever	41
Whooping-cough	295	Bornholm disease	25
Tonsillitis	289	Diphtheria	12
Mumps	233		
German measles	175	Total	4855
		Erythema nodosum	12

Influenza tops the list, followed by the diarrhœal diseases—often Sonne dysentery—and at the bottom, thank God, comes diphtheria.

Teaching bodies perhaps do not realise how few of these diseases, which loom large in a general practitioner's work, are ever seen by the student in his ordinary course. This seems to suggest that facilities should be given him to visit patients in their own homes, so that he does not see sufferers from these diseases for the first time when he takes up practice on his own account.

Furthermore, from the human point of view, it would be a corrective to hospital outpatients—that fascinating collection of interesting *cases*—for a student to go alone into a patient's home and get to know men, women, and children (not cases) and see at first hand under what conditions they live.

Erythema nodosum is not a common disease in my experience. Originally I charted it because it has many points in common with the exanthemata. Now I include it so that I may follow up its connexion with tuberculosis. To my sorrow, in one instance the connexion was only too evident—a little girl of eight, having just recovered from this disease, died in ten days from tuberculous meningitis.

One word about diphtheria prophylaxis. In my time in Wensleydale diphtheria has rarely appeared, but when it comes it kills and consequently preventive inoculation has been an especial care. I had some doubt, realising that subsequent actual experience of the organism was a factor in reinforcing immunity, whether it were possible to produce lasting immunity in a child population, where this would be largely lacking. I was agreeably surprised after Schick-testing 306 inoculated children that only 36 (11·76%) of these were reactors, and that after an average of three and a half years.

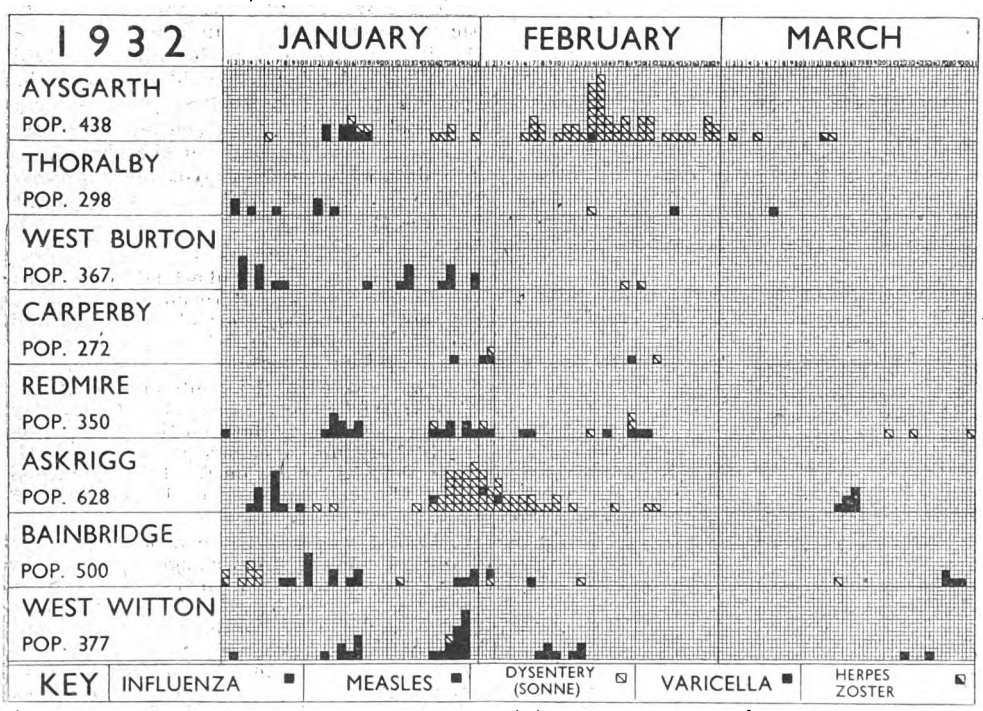
BORNHOLM DISEASE (EPIDEMIC MYALGIA)

To meet with one sufferer to whose complaint formal diagnosis cannot be given is no rare experience, but to be face to face with 7 who were apparently suffering from an undescribed infectious disease was the lot of my partner, the late Dr. Dean Dunbar, and myself in the summer of 1933. I should like to emphasise the atmosphere of utter helplessness which prevailed before a diagnosis was forthcoming, believing that a like experience might be the fate of other general practitioners.

In the early morning of a bright July day I was roused from my slumbers by a young farmer who, though of placid disposition, was on this occasion thoroughly alarmed. Would I come to one of his small boys who had been taken seriously ill?

This boy, aged 2 1/2 years, had been quite lively while being dressed, but was then suddenly attacked with pain in the upper abdomen and sweated profusely. When I saw him the pain was not so acute, but he was pale, taking short shallow breaths which were obviously causing him discomfort.

Later in the morning my partner saw him in a return of the pain and suggested that there was



Example of Village Epidemiological Records (In the actual charts the key squares are in various colours).

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a painful spasm of the respiratory muscles, probably of the diaphragm.

We saw him together at 3 P.M., and this was the picture. His face was flushed, his temperature was 101°F, and his respirations were definitely 60 per min. His alæ nasi were working and he had an expiratory grunt and a short cough. At this point things seemed clearer, and we felt we were justified in diagnosing early pneumonia although physical signs were quite negative.

In the evening he had improved, to add somewhat to our difficulties if at the same time to bring us peace of mind; his temperature was now 100°F and he had little respiratory distress and no pain.

Next morning—we were dealing with a strange disorder!—the little rascal, standing on the window-sill, greeted me smilingly, and I felt derisively, as I approached the house. I could find nothing on physical examination and I told the mother not to worry as the child was now quite well.

This was a rash remark, for next day the child had a replica of the symptoms, but thereafter he completely recovered.

The family consisted of father and mother and four little boys, and the boon companions of the boys were three little girls, who lived on the other side of the road. Two of these were bending over the little sufferer's couch on the first day of his illness. I warned the mother to pack them off and keep them away until we had decided what was wrong with her own child, but the mischief had already been done. The outcome was two of the brothers were attacked on the second and third day of the first little boy's illness and two of the girls on the fourth day.

We now felt we were dealing with a small epidemic of infectious disease of quite definite syndrome, unrecorded in our textbooks, and we sat down in our consulting-room and wrote out a summary of the symptoms:

(1) Onset with very acute spasmodic pain in the upper abdomen, accompanied by profuse sweating.
(2) Rapid shallow respiration, obviously painful. Pain on yawning and deep breathing and on laughing (between the spasms).
(3) Fever up to 103°F, rapidly subsiding but tending to rise again with a return of the pain about the third day and again on the fifth or sixth day.
(4) Complete absence of vomiting. Tongues coated, three of the white strawberry variety. No diarrhœa.
(5) No faucial injection, but nasal catarrh in one child and unilateral conjunctivitis in another.
(6) Pain in the knee in one child.
(7) A trace of albumin in the urine of another.
(8) No rashes.
(9) Complete recovery in four to six days and no sequelæ.

Lastly the father of the boys was attacked and the little epidemic came to an end.

Two problems were now for solution. Where did this strange disease come from? And could we give it a name?

The first was partially answered immediately. Four days before the outbreak two children from the York neighbourhood spent the day at the farm. One, a little girl, spent it on the sofa, sobbing with pain, and although I did not see her I feel sure she was the origin of the epidemic. That was as far as it could be traced.

The second problem was more difficult, but was eventually completely solved. I was fortunate in having been in communication with Dr. Ejnar Sylvest, a general practitioner of Copenhagen, on the subject of jaundice epidemics. He sent me articles on "myositis epidemica" or "Bornholm disease" and predicted that if I had not already encountered this disease I most certainly would at some future date. His references to epidemic pleurisy, epidemic pleurodynia, and transient diaphragmatic spasm helped us considerably, and finally a paper in French given before the Office Internationale d'Hygiène settled the matter without a shadow of doubt.

This is a very difficult disease to identify apart from an epidemic, and as there is no death-rate the only danger is that the appearance may be that of the "acute abdomen" and the patient may fall into the hands of the surgeon, as no doubt has happened on many occasions.

ENVOI

I hope I have conveyed a little of the atmosphere of a busy country practice. I speak from personal experience when I say it brings a full and happy life.

It may, of course, be a repetition of irksome tasks, but this is probably the fault of the practitioner, who, like Bunyan's man with the muck-rake, "rakes to himself the straws and sticks and dust of the floor and who can look no way but downwards, regardless of what is being held above his head."

BRONCHIAL CARCINOMA PRESENTING AS POLYNEURITIS

R. WYBURN-MASON
M.A., M.D. Camb.

A POLYNEURITIC syndrome sometimes develops in the late stages of cachectic states, such as those due to carcinoma or tuberculosis, and the tendency has been to ascribe it to deficiency of vitamin B_1 or malnutrition. But polyneuritis may also be the presenting symptom of bronchial carcinoma. Several of such cases have been seen at the National Hospital; no obvious cause for the polyneuritis could be found, and the correct diagnosis was sometimes not made before death. In such cases pulmonary symptoms have been either absent or inconspicuous until just before death.

The purpose of this paper is to draw attention to this association and to the desirability of searching for a primary tumour in elderly patients with polyneuritis and progressive deterioration. Three of these cases are here described.

CASE-RECORDS

Case 1.—A male cloakroom attendant, aged 52, was admitted on Dec. 19, 1940, under the care of Dr. E. A. Carmichael. Eight months before, after lifting a man injured in the blackout, he had woken next morning with a pain in the small of the back, which persisted. In the next few days a continuous ache had developed in his left calf, and the left leg had become increasingly weak in the next five months. The weakness had spread to the small of the back and both arms. Within the month before admission the right leg had also become weak, but not so much as the left, and there had been occasional numbness in the finger-tips. On trying to stand he had felt weak and tended to fall. The arms had also become weak. There had been only very slight loss of weight.

On examination.—A slight prematurely old man. Cranial nerves normal. Some slight general wasting of the upper limbs, associated with an equal and uniform weakness of all segments, but no incoördination; pronounced general uniform weakness of the lower limbs, with slight wasting but no incoördination.

All deep reflexes absent, abdominals absent, and plantars flexor. Gait slightly ataxic.

Sensation completely normal to all forms of stimulation.

Heart and lungs normal; blood-pressure 120/80 mm. Hg. Cerebrospinal fluid and fractional test-meal normal. Red-cell count 4,280,000 per c.mm., Hb 84%, colour-index 0·99, white cells 5200 per c.mm.

Radiography of chest normal on admission.

Progress.—The patient's symptoms increased, and he became grossly ataxic in all his movements and unable to stand. A glove-and-stocking anæsthesia appeared. During his stay in hospital he lost 5 lb. He was treated with large doses of liver extract and vitamin B_1. Suddenly in the sixth week after admission his temperature rose to 100°F one evening, and he became very dyspnœic and cyanosed. Moist sounds appeared in the left side of the chest. Radiography of the chest now showed a slightly widened mediastinal shadow in the left hilar region. He was treated with sulphapyridine, but died three days later.

Autopsy.—At the hilum of the left lung was a small growth, the size of a walnut, infiltrating the lung, and the neighbouring hilar glands were enlarged by hard masses of tumour. The brain, cord, and meninges were completely normal macroscopically. The posterior-root ganglia were slightly larger than normal and pinkish. They and some of the peripheral nerves were removed for section. All the other organs were normal.

Histology.—The tumour at the hilum of the lung and in the bronchial glands consisted of very numerous small round

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cells with multiple areas of necrosis. The nuclei were round or kidney-shaped, and the growth directly invaded the lung with no line of demarcation. The posterior-root ganglia showed slight œdema, hyperæmia, and degeneration of the fibres, as did some of the peripheral nerves, the anterior roots, and fifth cranial nerves. There was no evidence of infiltration by tumour cells. Brain, cord, meninges, spleen, liver, stomach, suprarenals, kidneys, and lymph-glands were all normal.

Case 2.—A man, aged 71, was admitted on Oct. 2, 1939, under the care of Dr. (now Prof.) D. Denny-Brown. Nine months before he had noticed that he was not walking steadily, especially in the dark. This had become progressively worse. From the beginning he had also noted a tingling in the feet and later in the finger-tips. In the last six months his legs and hands had become wasted and weaker, and he had some difficulty in holding his hands steady and in drinking from a cup.

On examination.—Cranial nerves normal. Incoördination of both upper limbs, worse on closing the eyes; some general weakness of all movements of arms; outstretched posture not well maintained; slight wasting of small muscles of the hands; no fibrillation; able to sit up unaided; pronounced incoördination of the lower limbs on closing the eyes; some general slight wasting of lower limbs; power good and equal.

All tendon-jerks absent; abdominal and plantar reflexes not obtained.

Well-marked loss of postural sensation in toes, slight loss in ankles, knees, fingers, and wrists; vibration not appreciated in limbs; impairment of all forms of superficial sensation in a glove-and-stocking distribution reaching to the wrists and knees.

Red-cell count 4,300,000 per c.mm., Hb 80%, film normal. Cerebrospinal fluid normal; jugular compression showed no spinal block.

Radiography of spine normal.

Progress.—The patient gradually got worse in spite of large doses of vitamin B_1. Early in December, 1939, he began to have a dry cough, but no abnormal signs could be found in the chest. The cough became more troublesome, and he complained of slight pain in the front of the right side of the chest. In the first week of January, 1940, he became pyrexial and dyspnœic, his symptoms increased, and many moist sounds could be heard in the right lower chest, both in front and behind. His right arm began to swell and feel heavy. He died on Feb. 5, 1940, after severe and intractable vomiting, with abdominal pain and distension.

Autopsy (Dr. J. G. Greenfield).—A tall wasted elderly man with sacral bedsores. Fat everywhere very yellow. Right arm very œdematous. Brain, spinal cord, and meninges showed no naked-eye abnormality. The dorsal spinal nerve-roots were greyish-pink in contrast with the white ventral roots. The right lung was adherent to the chest wall. Its substance was throughout firmer than normal, with much œdema and slight consolidation. At its roots was a large tumour involving the middle and lower bronchi. This was continuous with a mass of greatly enlarged adherent glands in the anterior mediastinum. A small abscess with necrotic centre and friable walls was present in the lower lobe. The left lung was healthy. The heart and aorta were healthy except for some atheroma, especially in the abdominal portion. The liver was normal but pushed to the right by great enlargement of the colon and stomach. The spleen was rather large and firm. The stomach wall was of normal thickness, the mucosa atrophic, and the organ unduly large. The small intestine was of moderate size. The colon was enormous throughout, being about 4 in. in diameter. Even the rectum was considerably larger than normal. The kidneys and suprarenals were healthy.

Histology.—The brain, cord, and meninges were normal. There was no evidence of invasion of the meninges or nervous system by cancerous cells. Weigert-Pal staining of the trigeminal and posterior and anterior spinal roots showed demyelination and interruption of many of the fibres, especially of the posterior roots. There was no sign of any cancerous invasion in the sections stained with hæmatoxylin and van Gieson. The peripheral nerves showed a very slight degree of demyelination, œdema, and hyperæmia. The lung tissue was infiltrated with numerous irregular sheets and trabeculæ of small round or oval cells with darkly staining nuclei and fairly well-defined cell bodies. The masses were separated by thin strands of collagen, and where the cells lay against these collagen fibres some were arranged in palisades and appeared almost columnar. No encapsulation was seen. The surrounding lung tissue was congested and œdematous. In one part of the section the cells were scattered about as small groups with a tendency to the formation of acini. Under high magnification these groups were seen to consist of about half a dozen cells lying in a circle surrounding a central area, staining pink with eosin. The nuclei of the cells were flattened as if they had secreted mucin. Considerable amounts of hæmorrhage were present.

Case 3.—A man, aged 59, was admitted on Jan. 20, 1939, under the care of Dr. Gordon Holmes. Fourteen weeks previously he had pain starting just below the ear and radiating down the right side of the neck; this lasted a fortnight. Next, the soles of his feet felt numb when he walked. This numbness gradually became worse and advanced up the legs a little; it then appeared round his mouth and gradually spread to the whole face. At the same time the hands were affected. The numbness reached its height in about a week, but in the fortnight before admission tended to spread up his arms. For three weeks before admission he felt an intermittent tingling in his hands and feet and occasional stabs of pain on the inner side of the ankles, behind the knees, and in the buttocks. His limbs had gradually become weak, and there had been a little difficulty in swallowing hard food. He lost 2–3 stone in the last four months before admission.

On examination.—Pale and wasted. Unable to distinguish pinprick in any part of the face, and sensation of light touch and temperature impaired in the same area; pinprick not felt on the tongue; impairment of taste on both sides of the tongue; loss of sense of posture of tongue; palatal reflex absent.

Slight wasting of all muscles of upper limbs, with hypotonia; power good and equal; well-marked ataxia in finger-nose test; unable to sit up unaided. Gross wasting of all muscles of lower limbs, especially the quadriceps and calf muscles, with hypotonia; muscles felt spongy and tender to pressure; power grossly diminished, hip and knee movements being moderately affected and dorsiflexion and plantar flexion of ankles and toes more severely; gross ataxia; no fibrillation.

All tendon reflexes and abdominals absent; plantars flexor.

Patchy impairment of pain sensation throughout whole body, with a few places where pinprick was recognised on the thighs and over the abdomen; complete loss more peripherally. Severe impairment of touch and temperature sensation throughout; loss of sense of passive movement at all joints; vibration appreciated only on clavicle, sternum, and upper dorsal spine; complete astereognosis in both hands. Gait (with assistance) shuffling and ataxic. Electrical reactions of muscles normal.

Heart normal. Blood-pressure 120/90 mm. Hg. Liver just palpable at costal margin. Dullness over the lower lobe of right lung both anteriorly and posteriorly; bronchial breathing, crepitations, ægophony, and whispering pectoriloquy at the left base. Red-cell count 4,840,000 per c.mm., Hb 92%, colour-index 0·95, white cells 13,400 per c.mm. (polymorphs 84%). Cerebrospinal fluid clear and colourless; 1 cell per c.mm.; protein 100 mg. per 100 ml.

Progress.—The patient gradually became weaker. On Feb. 18 he became very severely ill, with Cheyne-Stokes respiration. There was now impaired movement, with a loud pleural rub, at the right apex and tubular breathing with coarse dry crepitations at both bases behind. On March 3 his temperature suddenly rose to 101·4°F, and he died on the 5th.

Autopsy (Dr. J. G. Greenfield).—The brain appeared normal. The sensory roots of the trigeminal nerve were greyer than the motor roots. Spinal cord normal. The dorsal roots were everywhere rather more grey than the ventral roots, especially in the lumbosacral enlargement, where they were congested. The meninges were normal. Left pleural cavity contained some turbid yellowish fluid, but little evidence of pleurisy was found. In the right lung a mass of degenerating growth was present, coming to the surface over the outer aspect of the lower lobe and connected with a firmer mass arising in the wall of the bronchus to the lower lobe. There was a mass of glands at the hilum. Some small patches of bronchopneumonic consolidation were present on the surface of the left lower lobe. The liver was shrunken and rounded, quite unlike the normal shape; its cut surface was firm and rather yellow. The spleen was slightly enlarged and soft,

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with some softened tumour tissue on its inner surface from the wall of the stomach. At the upper margin of the stomach, near the cardiac end but not reaching it, was a cancerous ulceration covered with blackened blood on its inner surface. For a few centimetres the lower end of the œsophagus was diffusely swollen, but not ulcerated. The stomach itself was much distended, but the pyloric end was normal, as were the intestines, kidneys, suprarenals, bladder, and prostate.

Histology.—The tumour of the stomach and lung consisted of fairly solid masses of very elongated darkly staining nuclei with no visible cell body, except in mitotic cells. These masses were intersected, but not broken up into alveoli, by fine connective-tissue fibrils. The cells were not elongated and less degenerated, and the connective tissue less in evidence, than in most bronchial carcinomata. In the lung the tumour cells were rounder than in the stomach. The anterior and posterior spinal roots and the trigeminal ganglia showed some demyelination of the nerve-fibres as revealed by Weigert-Pal and Gross staining but contained no tumour cells. The peripheral nerves were normal.

DISCUSSION

Several explanations of the origin of the polyneuritic syndrome seem possible.

(1) It might be the result of involvement of the endoneural and perineural lymphatics of the peripheral nerves by extension of the growth.

Cornwall (1927) reported a case of primary gelatinous carcinoma of the stomach which he thought had spread by this method, "as metastases were observed in the zone occupied by nerve-fibres in the stomach wall, in the peripheral sheaths of the skin nerves, in the subarachnoid space, in the perivascular lymph spaces of the encephalon, and within the substance of the optic, facial, and auditory nerves." The leptomeninges over the base and convexity of the brain were thickened and opaque and the cranial nerves at their points of emergence were all surrounded by exudate containing tumour cells, which were also present in their substance. The presence of cerebral metastases, however, must make this explanation open to criticism.

Schewtschenko (1930) described a diffuse invasion of the pia-arachnoid secondary to a testicular tumour. Extensive retroperitoneal deposits of growth were present, the nerve-roots and ganglia being ensheathed by growth, and he believed the meninges to have been invaded through the intervertebral foramina. However, blood-borne metastases were present in several viscera, and many tumour cells in the choroid plexuses, and these may have been the origin of the cells in the nerve-roots.

Miskolczy (1909) described a case of meningeal sarcomatosis secondary to a tumour of the ribs, the nerve-roots and spinal ganglia exhibiting deposits of growth, which were held to indicate ascending invasion of the theca by way of the nerves. Here again the presence of cerebral metastases justifies doubts about the correctness of this view.

Knierim's (1908) case of gastric carcinoma showed infiltration of the spinal and cranial nerves and ganglia. The sacral roots were invaded by nodules of growth. Microscopically the primary tumour had reached the vertebral canal by growth through the lymph channels of the sacral nerves. However, carcinoma cells were found diffusely over the whole surface of the brain, lying in groups or singly in the subarachnoid space, the vessels of which were surrounded by a mantle of cells. Infiltration of the optic and 7–11th cranial nerves was found. The presence of these changes justifies doubts about the correctness of Knierim's interpretation.

To substantiate such an explanation it would be necessary to show (*a*) that extensions of the primary growth were present round the peripheral nerves or vessels up to their point of entry into the bony foramina; (*b*) that vessels or nerve-roots and ganglia exhibited similar changes within the spinal canal; and (*c*) that secondary growths in the brain or cord were not present. None of the above cases fulfils these three conditions. If this mechanism was the cause of symptoms we should expect the nerves to be affected locally and asymmetrically rather than in a generalised manner as in the cases here described.

(2) The second method by which the clinical picture might arise is by implantation of tumour cells on the intrathecal portions of the spinal nerves. The tumour cells might be liberated into the subarachnoid space from metastases in the brain, choroid plexuses, or basal meninges.

Hassin (1919) and Hassin and Singer (1922) have shown that the former type of metastasis is blood-borne, whereas those involving the basal meninges probably arise by lymphatic extension from the cervical lymph vessels and glands, just as with nasopharyngeal tumours. These basal meningitic metastases often involve the cranial nerves (giving rise to so-called polyneuritis cranialis), floor of the third ventricle, and pons. The Virchow-Robin spaces and the network of the pia-arachnoid are sometimes full of cells (Ginsberg 1921, Putschar 1930, Fried 1925, Heinemann 1911). From either type of metastases cells may be liberated into the cerebrospinal fluid, where they may be found by lumbar puncture. They gravitate downwards, and seedlings may be found on the spinal nerves and round the cord, forming a sheath to these structures and causing degenerative changes. Presumably owing to the supine position, the posterior surface of the cord and the posterior roots are most affected, the roots and meninges being thickened, opaque, and nodular. The effect of gravitation is to make these changes greatest in the cauda equina, gradually decreasing on ascending the cord. The changes are also asymmetrical, as are those at the base of the brain. Hence in those cases in which this mechanism is responsible for symptoms the clinical findings are asymmetrical and most marked in the legs and regions supplied by the cranial nerves, and sensory symptoms are more in evidence than motor. Examples of this type of case secondary to bronchial cancer were those of Selinsky (1930), Miller (1917), Heyde and Curschmann (1906), Craig et al. (1939), Alpers and Smith (1920), Rehn (1906), and Shennan (1928).

A similar sequence of events has been found with primary tumours of other organs (Barnes 1905, Danisch and Nedelmann 1928). In these cases the cerebrospinal fluid usually contains many cells and shows a great increase in protein content. Little is known of the early stages of infestation of the nervous system in this condition, but presumably a period must exist in which it is impossible to find carcinomatous cells in the central nervous system even by the most careful search. No such changes in the nervous system were present in the cases described above.

(3) The third method by which polyneuritic symptoms might arise is by a "toxic" or "metabolic" disturbance of the peripheral nerves, associated with the carcinoma and similar to polyneuritis arising from other causes. This condition would be symmetrical and generalised and involve both the cranial and spinal nerves according to their length. The central nervous system would not be involved by growth. The cerebrospinal fluid would be normal or contain only a slight increase in protein. Examination of the peripheral nerves would show no infiltration by tumour cells, and all regions of the cord and motor and sensory nerves would be equally involved. In the early stages of the cases described there was no suggestion of any toxic or metabolic disturbance which might cause the symptoms.

(4) The fourth possible explanation is that the disturbance of nervous function is produced reflexly from the lungs. From the lungs afferent nerve-fibres enter the upper dorsal and vagus nerve-roots. Lung disease is not infrequently accompanied by the changes of hypertrophic pulmonary osteo-arthropathy, the manifestations of which may be dramatically relieved by removal of the lung (Rottjer et al. 1946 and others). In two cases known to me mere ligature of the pulmonary artery without removal of the lung had the same immediate effect. This shows that the changes in the tissues are not due to "toxic" absorption or anoxia, which would be increased by this procedure. They are probably reflex in causation. The polyneuritic syndrome might be of a similar nature.

In the cases here described the histological and clinical findings were in accordance with this last mode of production, and in one case even after fourteen months of neuritic symptoms no evidence of involve-

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ment of the nervous system by cancerous cells could be obtained.

SUMMARY

Three cases of polyneuritis complicating bronchial carcinoma are described. In each case the pulmonary symptoms were in abeyance and the patients sought aid for neuritic symptoms.

The patients were men aged 52, 59, and 71 years. In two cases the right lung and in the other the left lung was affected. In two cases the tumours were comprised of small round cells and in the other of "oat" cells. The cerebrospinal fluid in two cases was normal, whereas in the third it contained 100 mg. of protein per 100 ml. The course from the onset of symptoms to death ranged from five to fourteen months.

The ætiology of the polyneuritis is discussed, and it is concluded that this is the result of a nervous reflex from the lung.

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TREATMENT OF SCHISTOSOMIASIS

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WE have investigated the action of sodium antimony tartrate in intensive doses in the treatment of schistosomiasis, following the method of Alves and Blair (1946) except for minor modifications in the way of giving the drug.

The patients were referred to us from one of the government mobile outpatient units, without regard to the degree of anæmia or the severity of infection, and were warned that they would be kept in hospital at least two months. They consisted of 16 males without cardiac, respiratory, renal, or liver trouble; 14 of them had urinary, and 2 intestinal, schistosomiasis.

The total dose of sodium antimony tartrate was gr. 1 for every 5 kg. of body-weight and was divided into six more or less equal doses (Alves 1945), which were given on two successive days at 8 A.M., 11 A.M., and 2 P.M. The drug was freshly prepared in a concentration of gr. 1 per ml. in 30 ml. rubber-capped bottles. Any solution left in the bottles after the injections of the first day was discarded. The necessary injections were given over a period of 5 minutes, as recommended by Alves and Blair (1946), who emphasise that "the slow and steady injection of the drug is of fundamental importance in the success of the treatment." Of our 16 patients 12 received the necessary dose undiluted, but in 4 cases the dose was made up to 10 ml. with 5% glucose solution. We used no. 12 needles and all-glass, 'Record,' and 'Vim' syringes, and found that the last were the best to ensure a smooth flow of fluid into the veins. All our syringes and needles were boiled each time before the injections were given. On the night before treatment the patients were given a light supper, and on the days of treatment they were allowed no breakfast but only a glass of milk or lemonade at noon and a light supper.

TABLE I—INCIDENCE OF REACTIONS TO SODIUM ANTIMONY TARTRATE IN 16 PATIENTS

Reaction	Injections on first day of treatment			Injections on second day of treatment		
	1st	2nd	3rd	1st	2nd	3rd
Cough	8	9	6	3	3	1
Vomiting	3	12	8	4	6	6
Tightness of chest ..	1	4	3	—	3	2
Pain in arm and shoulder	4	3	2	2	3	2
Pain in joints and back	3	4	2	5	5	6
Faintness	1	3	3	2	2	3
Fever	—	1	5	—	2	7
Toothache and metallic taste	—	1	1	—	1	1
Irritation in bladder	—	2	2	1	3	4
Choreiform movements	—	2	5	4	5	5

REACTIONS TO SODIUM ANTIMONY TARTRATE

The immediate reactions were rather severe and in some cases drastic, but no late after-effects were encountered. The reactions occurred in the same way whether the drug was given diluted or not. The commonest reactions were cough, vomiting, tightness of the chest, pyrexia, and pain in the arm or shoulder on the side in which the injection was given. Other less common reactions were pain in the joints and back, a sensation of fainting, toothache and a metallic taste in the mouth, a sense of irritation in the bladder, and a peculiar choreiform movement of the arms and legs. Most of these reactions were less common on the second than on the first day (table I).

The most severe reaction encountered was vomiting. Though the patients had no breakfast, some of them vomited small amounts of greenish fluid after each injection. As a rule, if a patient had had anything to drink immediately before an injection he did not vomit until about two hours later, but he usually vomited during or immediately after receiving the injection if he had drunk something about two hours before. Vomiting was severe in some patients and was likely to occur at any time during the two days of treatment, and in one case it persisted for two days afterwards. On the whole the patients had no appetitite and preferred to stay without food throughout the two days of treatment.

They invariably looked ill and exhausted and dreaded the injections; young boys had to be coaxed and in some cases forced to have them. No-one left his bed during the days of treatment except when it was necessary.

Pain in the arm at the site of injection was complained of during the injection and for a few minutes after it in 4 cases; in 2 cases it was severe and occurred regularly with each injection.

A peculiar feature which we have never seen described was the irregular involuntary movements of the limbs in

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some cases. These movements simulated chorea and were seen only during treatment.

In 6 of the 16 cases there was a complaint of general weakness and pains in the joints and back resembling influenza. None of these reactions persisted for more than two days after the end of treatment, by which time the patients were up and about.

Pulse-rate and Blood-pressure

In every case the pulse-rate was counted and the blood-pressure measured before and 15 min. after each injection. Of the 16 patients, 6 showed a fall in pulse-rate of 10–20 beats a minute after each injection; this bradycardia usually disappeared before the next injection was due and in no case persisted until the following morning. Two of the patients showing bradycardia received atropine 1 mg. half an hour before the last injection on the second day of treatment, and in both cases no bradycardia appeared when the antimony was given.

In these 6 cases the blood-pressure remained more or less constant during the course of treatment. In 2 other cases there was a mild drop in the systolic but not in the diastolic blood-pressure, and these had a moderate acceleration of the pulse-rate.

Electrocardiographic Findings

An electrocardiographic record of every patient was taken before treatment, at the end of the first, and second, day's treatment, and again within the following week, different groups having their last records taken on different days during the week, to find out when any changes that might appear would return to normal. In 2 cases a fifth record was taken on the eleventh day after treatment.

The electrocardiogram was recorded in the three standard leads and in lead IV R, in which the left-arm wire is attached to the precordial electrode and the right-arm wire to the right-arm electrode, the record being taken with the switch on lead I. This precordial lead gives a normal upright T wave.

Records taken before the antimony was given were normal except in 4 cases where sinus arrhythmia occurred and in another case where deviation of the electrical axis was seen. Changes in the Q R S complex and the T wave appeared at the end of the first day, became more pronounced by the end of the second day, and were still more pronounced on the day after the end of treatment. The amplitude of the Q R S was diminished in 5 cases in lead I, in 4 cases in lead II, and in 1 case in each of leads III and IV. The T wave became flat or inverted in 15 cases in lead I, 15 cases in lead II, and in 10 cases in lead III, and distinctly inverted in all cases in lead IV. There were no changes in either the P wave or the P–R interval.

The 2 patients who received atropine 1 mg. before the last injection on the second day showed the same electrocardiographic changes.

The electrocardiogram began to go back to normal on the second day after treatment, and recovery was well marked on the seventh day but was not absolute even on the eleventh day after treatment.

TABLE II—RESULTS OF SEARCH FOR BILHARZIA OVA AFTER TREATMENT WITH ANTIMONY

Case no.	Days after treatment											
	2nd	9th	16th	23rd	30th	37th	44th	51st	58th	65th	72nd	79th
1	A	A	D	—	—	—	—	—	—	..	..	..
2	A	A	D	—	—	—	—	—	—	..	..	..
3	A	A	D	—	—	—	—	—	—	..	..	..
4	A	AD	—	—	—	—	—	—	—	..	..	..
5	A	A	AD	D	D	D	D	D	D	D	AD	AD
6	A	A	AD	D	D	D	D	D	D	D	D	D
7	A	A	D	—	—	—	—	—	—	..	..	..
8	A	A	—	—	—	—	—	—	—	..	..	..
9	A	A	D	—	—	—	—	—	—	..	..	..
10	A	A	—	—	—	—	—	—	—	..	..	..
11	A	AD	D	D	D	D	D	D	D	D	D	D
12	A	A	AD	D	D	D	D	D	D	D	D	D
13	A	A	AD	D	D	D	D	D	D	D	AD	AD
14	A	A	D	—	—	—	—	—	—	..	..	..
15	A	AD	—	—	—	—	—	—	—	..	..	..
16	A	AD	D	—	—	—	—	—	—	..	..	..

A, living ova present; D, dead ova present; —, no ova present.

TABLE III—INCIDENCE OF REACTIONS IN SIX-DAY TREATMENT WITH SODIUM ANTIMONY TARTRATE

Reaction	Day					
	1st	2nd	3rd	4th	5th	6th
Cough	3	2	3	1	1	2
Vomiting	2	2	1	1	1	
Tightness of chest ..	2	—	—	—	—	—
Pain in joints and back	1	—	—	—	—	—

Radiography

In all cases a radiogram was taken before and within four days from the end of treatment. In no case was there any appreciable change in the size of the heart or in lung shadows.

Hæmoglobin

The hæmoglobin was estimated on the day before treatment was started. In 14 cases it ranged from 50% to 80%, in 1 case it was 25%, and in 1 it was 30%. In 7 cases it was estimated on the second day after the end of treatment, and here it was invariably higher than before treatment. This rise was most likely a result of hæmoconcentration, because it seemed to run parallel with the severity of the reactions to the antimony and the degree of dehydration. This association was most striking in a boy of 13 who vomited persistently all through the two days of treatment and two days afterwards; his Hb rose from 60% to 90%. By the ninth day after treatment the Hb in most cases had fallen to its previous level, and weekly estimations done afterwards showed a gradual rise. The 2 very anæmic patients stood the treatment well and did not have any severer reactions than did the other patients (see table V).

Weight

All patients were weighed on the day before and on the second day after the end of treatment. All showed a loss of 1–3 kg. but they regained their weight in ten to fourteen days and as a rule put on 2–6 kg. by the end of two months (see table V).

Urine and Stools

Examination of urine and stools was our guide in diagnosis and our standard test of cure. Our series included only 2 cases of intestinal bilharziasis, the rest being urinary cases. We preferred urinary cases because of the ease of detecting ova in the urine. The urine was examined for the presence of red cells, bilharzia ova, and casts. If ova were seen, we had to decide whether they were alive or dead. Examinations were made on the second day after treatment and at weekly intervals afterwards.

The patients continued to complain of hæmaturia until about the tenth day after treatment, after which the urine gradually became clearer, and by the end of the second week they all testified to the relief of their urinary symptoms. Microscopical examination of the

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TABLE IV—RESULTS OF SEARCH FOR BILHARZIA OVA AFTER SIX-DAY TREATMENT

Case no.	After 3rd injection	Day after treatment									
		5th	11th	18th	25th	32nd	39th	46th	52rd	60th	67th
17	A	D	D	—	—	—	—	—	—	—	—
18	A	A	AD	D	D	D	D	D	AD	AD	AD
19	A	A	D	—	—	—	—	—	—	—	—
20	A	AD	D	D	D	D	D	D	D	D	D
21	A	D	—	—	—	—	—	—	—	—	—
22	A	A	A	D	D	D	D	D	AD	AD	AD
23	A	AD	D	—	—	—	—	—	—	—	—
24	A	A	D	—	—	—	—	—	—	—	—
25	A	AD	D	—	—	—	—	—	—	—	—

A, living ova present; D, dead ova present; —, no ova present.

urine, however, did not show such a high proportion of cures as was suggested by the relief of subjective symptoms. The results obtained are shown in table II.

The weekly examination of the urine afforded a valuable chance to study the ova that were being passed. On the second day after the end of treatment all the patients were still passing living ova, but by the ninth day some were still passing living ova while others were passing both living and dead ones. By the twenty-third day any ova that were still being passed were dead, and eventually there were 5 patients who had continued to pass ova for eighty days.

The presence of ova in the urine was always accompanied by hæmaturia, though the number of ova and the degree of hæmaturia were invariably much less than before treatment.

In 2 cases the ova began to improve in shape at the end of the fifth week after treatment, and by the seventy-second day living ova with moving miracidia were seen in the urine. This suggests that, though antimony is capable of killing most of the worms harboured by a patient, some worms are not killed but have their reproductive system so damaged that they produce only dead ova. When, however, the toxic action of the antimony has worn off, some of the worms that have survived the treatment recover and produce living ova. This supports the experimental studies of Fairley and the work of Dye (cited by Manson-Bahr 1945), which indicate that antimony acts selectively on the reproductive organs of the female worm, causing first the appearance of dead eggs and later the cessation of egg-laying. Our work proves that, provided the worms are not destroyed, they can in time recover from the toxic effect of the drug and resume production of living ova.

We found that the best way to detect the ova in the urine was to collect the urine in a conical flask and stand it for an hour to allow the ova to settle, and then to pipette out a sample from the bottom of the flask. Dead ova are very fragile, and any attempt to centrifuge the urine would break them up.

With experience it could be easily decided whether the ova were alive or dead by microscopical examination, and only rarely was it necessary to try to hatch them. Dead ova are smaller than living ones, measuring on an average 120 × 45 μ whereas living ova measure 160 × 60 μ. Typical appearances are drawn in the accompanying figure. The shell of a dead ovum is wrinkled and is often bent into various shapes, is darker, and lacks the translucency of the healthy ovum. Inside the dark shell of the dead egg the characteristic miracidium is not seen, but only a mass of shrunken tissue. We never considered an ovum to be alive unless we could see the miracidium moving inside the shell or could hatch it.

In all our cases examination of fresh samples of the urine did not show any casts.

None of our patients when followed up for three months gave any indication that antimony is toxic to the liver.

In our experience the chances of cure with sodium antimony tartrate do not depend on the severity of the infection.

SIX-DAY TREATMENT

Seeing that the two-day treatment with slow injections of antimony would be difficult to apply in large-scale campaigns, because of its many undesirable reactions, we have since treated 9 patients by giving the same dose as recommended by Alves (1945) over six successive days. The patients were followed up in the same way as in the previous group.

The reactions met with are shown in table III, which shows that the reactions were fewer than with the two-day treatment; on the whole they were also milder.

Since allowing 5 min. or more for the injection of the necessary dose greatly limits the number of patients that can be treated by any one doctor, in this group we injected the antimony undiluted, allowing only $^1/_2$ min. for each injection.

There were no changes in pulse-rate, blood-pressure, or radiological findings, and, as table V shows, no fall in weight or hæmoglobin as a result of the treatment. Electrocardiograms taken before the treatment was started, after the third and after the last injections, and three and six days after the end of treatment show changes which were much milder than with the two-day

TABLE V—CHANGES IN WEIGHT AND HÆMOGLOBIN

Case no.	Before treatment		Immediately after treatment		Two months after treatment		
	Hb %	Weight (kg.)	Hb %	Weight (kg.)	Hb %	Weight (kg.)	Relapse
	TWO-DAY TREATMENT						
1	70	55·0	..	53·0	78	57·0	—
2	70	57·5	..	56·0	85	59·5	—
3	30	31·5	..	29·0	65	33·5	—
4	25	62·3	..	60·0	55	68·5	—
5	50	45·0	..	43·5	60	47·5	+
6	68	56·5	..	55·0	75	59·0	+
7	70	46·0	..	43·0	75	48·5	—
8	65	25·4	..	23·0	70	27·5	—
9	65	56·5	..	55·0	70	59·0	—
10	60	31·2	90	28·0	65	34·0	—
11	80	61·8	90	60·5	85	65·0	+
12	65	59·0	75	57·0	72	62·5	+
13	70	46·7	80	45·0	75	49·0	+
14	60	54·0	70	52·0	75	53·5	—
15	68	54·0	75	53·0	75	56·0	—
16	70	53·5	78	52·5	75	56·0	—
	SIX-DAY TREATMENT						
17	70	64·0	77	64·5	80	68·0	—
18	50	40·0	50	39·5	57	43·0	+
19	75	64·0	78	63·5	80	67·0	—
20	62	36·5	75	35·0	80	39·0	+
21	75	82·0	90	82·5	85	92·0	—
22	75	52·0	65	52·0	73	54·0	+
23	62	67·0	78	65·0	80	69·0	—
24	82	34·0	78	33·0	85	36·0	—
25	50	69·5	50	69·5	60	72·0	—

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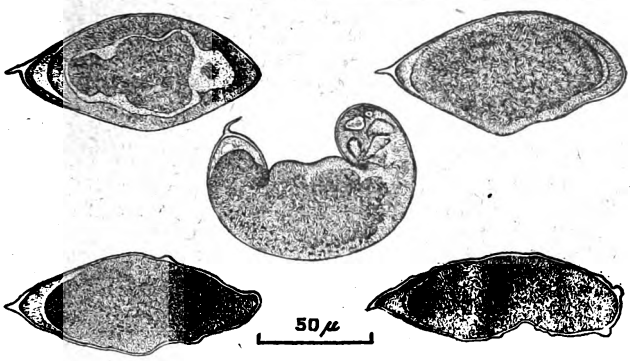

Dead ova of *Schistosoma hæmatobium*

treatment, and which compare favourably with those recorded by Mainzer and Krause (1940) and Kenawy (1940) who gave potassium antimony tartrate as recommended by Christopherson (1918). Of our 9 cases, 4 showed electrocardiographic changes similar to the two-day group, but 5 showed only a slight flattening of the T wave, mainly in lead III.

The urine was examined after the third injection, five days after the end of treatment, and subsequently at weekly intervals. The results obtained are shown in table IV, which shows that the 3 patients who were passing ova on the 18th day continued to do so, and by the 53rd day after the end of treatment living ova were detected in the urine of 2 of them. As in the two-day group, ova in the urine were always accompanied by microscopical hæmaturia. All the other patients, who had ceased to pass ova, had no hæmaturia.

DISCUSSION

The problem of eradicating schistosomiasis is still unsolved, and much work remains to be done before a method of dealing with it can be worked out and carried through with a fair measure of success. The main needs are as follows:

(1) To work out a line of treatment which is effective, easy to carry out and fairly safe, and to detect and deal with relapses, if any. This is the object of the present inquiry.

(2) To find out means of dealing with patients who besides being subject to schistosomiasis suffer from chronic heart, lung, liver, or kidney disease, and who could not be managed under schemes intended for mass treatment, and if not so treated would be a potential source of infection.

(3) To work out a scheme for destroying the snails and preventing the spread of infection from place to place.

The two-day treatment of Alves (1945) is certainly an advance over the old method introduced by Christopherson in so far as it shortens the period of treatment and so helps to reduce the number of desertions among patients; but in our hands it proved too drastic to be useful in large-scale campaigns where treatment has to be conducted in outpatient units. Besides, the rate of relapse in the 16 cases in which we tried the treatment was 31%, which is no improvement on the results obtained in mass campaigns in Egypt reported by Khalil (1928). This means that the dose recommended is inadequate; yet any increase would probably have serious consequences. The slow method of injecting the drug also does not diminish the incidence or severity of the reactions or prevent the myocardial changes detected by electrocardiography.

The six-day treatment that we tried on 9 patients has diminished the incidence and severity of the reactions as well as the myocardial changes. It enables an outpatient unit to treat twice as many patients as under the old scheme, and cuts down to a quarter the time needed for treatment. The rate of relapse is, however, slightly higher than with the two-day treatment, but in the six-day treatment there is more chance of increasing the total dose with a fair degree of security. The optimal dosage and the safest time to spread it over are subjects for future study.

Relapses

The present work throws some light on the problem of relapses. Christopherson (1919), who believed that antimony killed not only the bilharzia worm but also the embryo in the ova deposited in the terminal vessels, differentiated relapses into true and apparent. He considered cases that showed albuminuria and passed red blood-cells and dead ova only as apparent relapses, because there was no criterion that they harboured living worms. To him the only criterion of a true relapse was the presence of living ova in the urine.

In our cases we have never been able to discover living ova in the urine between the end of the second and the fifth week, but we observed a gradual change in the type of the ova that were being passed, and by the end of the eighth week we found living ova in the urine of 4 patients. Lasbrey and Coleman (1921) also found dead eggs in the urine of their hospital workers a year after they had received treatment. It seems inconceivable that ova deposited in the wall of the bladder or rectum before treatment could take as long as a year to pass into the urine or stools, and we are inclined to believe that the dead ova found in some cases after treatment are produced by live schistosome worms in the patient. Some of these worms needed eight weeks to recover, but others may take much longer; hence the long and continuous production of dead ova.

We gave a second course of 18 mg. of antimony per kg. of body-weight, divided into six equal portions over six successive days, to 2 of the 8 relapses in our series and were able thus to stop the production of dead ova in the urine. This, combined with the cessation of hæmaturia in these 2 cases, is to us strong evidence that the patients were still harbouring some live worms, which were destroyed by the second course of antimony, the ova ceasing to appear in the urine.

It thus seems reasonable to consider any relapse a true one so long as dead or live ova are being passed, but a patient who passes only dead ova is of course no danger to the community since he cannot propagate schistosomiasis.

SUMMARY

Of 25 cases of schistosomiasis treated with sodium antimony tartrate, 16 had a two-day course and 9 a six-day course.

The relapse-rates were 31% and 33%.

All patients who were cured ceased to pass ova and had no microscopical hæmaturia by the end of the third week after treatment.

In 8 cases ova were still passed and there was microscopic hæmaturia; these are considered to be true relapses.

Of these relapsed cases, 2 received a second course of treatment and ceased to pass ova or blood in the urine.

Severe immediate reactions and electrocardiographic changes were encountered after the two-day treatment, but these were milder and less common after the six-day treatment.

We are grateful to Mr. N. Strekalovsky for the drawing.

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CLICKING PNEUMOTHORAX

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THIS striking and dramatic physical sign, termed by some observers "pericardial knock," consists of a clicking noise synchronous with the heart beat and often audible at some distance from the patient.

It was first described in 1885 by Cornils, who noted the sign in a man, aged 23, with advanced phthisis. Necropsy revealed a small left lower pneumothorax and no pleural effusion.

Morris (1902) described it in a patient who fell thirty feet:

> "The first thing noticeable when I saw him on the next day was an extraordinary sound which came from the interior of his chest and was synchronous with the cardiac systole. It was something between a click and the noise made by a bursting bubble and was distinctly heard all over the room. . . . The clicking sound was audible . . . for four days and was always worst when he turned on to his left side."

This appears to be the first reference to the effect of posture on the sign.

During the war of 1914–18 several observers noted this sign in cases of injuries of the left chest, chiefly with foreign bodies present.

Rees and Hughes (1918) recorded "pericardial knock" in nine cases of penetrating wounds of the left chest. It persisted from 24 hours to 14 days, was loud on inspiration and quieter on expiration, and was synchronous with the heart beat. In five of the nine cases the sign was only audible on auscultation, whereas in the remaining four it was also audible to the patient and bystanders. Rees and Hughes considered that the sign was quite unlike pericardial friction, even though it was precordial and synchronous with the heart beat.

Smith (1918) reported further cases in war surgery and discussed the causation. This report stimulated Munden (1918) to record a case in a child who had received a gunshot wound of the left chest. In Munden's case there was no respiratory relationship; though the child had Cheyne-Stokes respiration, the sign was constantly present, even in the periods of apnœa.

Lister (1928) reported its occurrence in spontaneous pneumothorax unassociated with trauma. He clearly recognised that changes in posture were a significant factor. In his patient the "knock" was present if the patient sat up or stood up, but disappeared if he lay down. It also disappeared on full inspiration. The sign was present for three weeks, and the final disappearance coincided with the development of a left pleural effusion of moderate bulk.

Barnwell (1937) reported it for the first time in artificial pneumothorax as opposed to spontaneous or traumatic pneumothorax. He stated that Dr. J. A. Greene and himself had found that it only occurred in a left pneumothorax which was free from fluid, and free from adhesions restricting the free fling of the heart in the left pneumothorax cavity. They considered the sign "diagnostic of a combination of these conditions."

Scadding and Wood (1939) reported four cases in shallow spontaneous pneumothorax. In two of them the click was audible to the patient and bystanders. In view of this, these workers induced a left artificial pneumothorax in four cases of pulmonary tuberculosis of limited extent, introducing only very small volumes of air.

They made careful observations during the induction to determine if the click could be heard. They detected it in two of the four patients, but could find no anatomical difference between the two patients in whom it was present and the two patients in whom it was not.

In the patients with the click it was present only when the artificial pneumothorax was very shallow, and disappeared in both as soon as the pneumothorax was made deeper. Thus, in one patient, after an initial induction of 25 c.cm. the click was audible, but on the introduction of 150 c.cm. the click disappeared.

They record the postural and respiratory variations of the sound, and differentiate between this sound and those heard in mediastinal emphysema. Further, they consider this physical sign to be responsible for one variety of systolic gallop rhythm.

Gallavardin (1913), Thompson and Levine (1935), Johnston (1938), and others have also discussed the extracardiac origin of some cases of systolic gallop rhythm.

Wolferth and Wood (1930) and Sharpey-Schafer (1939) each reported a further case in spontaneous pneumothorax.

A fuller exposition of the views of Barnwell and Greene was made by Greene (1943). They produced the sounds experimentally in some patients by introducing air into the colon in amounts sufficient to distend the splenic flexure. In some cases the sign was systolic in timing, and in others it was diastolic. Greene also records that the sound was present in "varying degrees of collapse from 25% to almost 100%."

Thomson (1947) fully described two cases of clicking pneumothorax and briefly reviewed five more. In five the sound was detectable with a stethoscope, but in two the patient alone complained of the clicking. Thomson concluded that the clicking was probably due to an air-bubble in contact with a pleural adhesion. In two of his cases such a bubble was demonstrated radiographically. He says, however, "the sound immediately disappears if the pneumothorax increases in size."

I record here the following two personal cases.

CASE-RECORDS

Case 1.—A man, aged 23, had a left artificial pneumothorax induced for an early infraclavicular lesion with cavity formation. At the time of the induction 300 c.cm. of air was given. Within a couple of minutes a click accompanied by a palpable impulse in the fourth interspace at the left edge of the sternum, systolic in time, and audible at the foot of the bed was detected, and at this time it was independent of posture or respiration.

Refills were continued, and a good selective artificial pneumothorax was obtained except for the presence of one lateral band adhesion, which was divided at thoracoscopy in the fourteenth week. Thereafter the patient had a completely free lung.

On radioscopy the respiratory excursion of the lung and the transmitted impulse from the heart and aortic arch were such, that at each cardiac impulse the whole lung rocked on the hilum. The lung was exceptionally mobile in the pneumothorax space.

The click was always systolic in time, but after a few weeks it was present only when the patient lay on his back or slightly over to the left, and when he held his breath just short of full inspiration. Lying over to the right or further over to the left caused the sign to disappear.

The click was present for about eighteen months, during which it seemed unaffected by refills. Since then it has become very inconstant, and though the patient has been observed for another fifteen months it has been detected only very occasionally, when the patient lies prone or is running downstairs. It has also become much quieter, and its position has altered, being now nearer the apex-beat.

When the sign became inconstant there was no apparent alteration in the artificial pneumothorax. There had been no alteration in the degree of the collapse, no development of fluid except occasionally in the costophrenic angle, no diminution in the mediastinal mobility, and no alteration in the intrapleural pressures, which have always been negative.

The patient described the sensation as "flicking," and said the feel as well as the sound could be reproduced exactly by gently flicking a finger against the palm of the hand. The click did not disturb the patient's rest.

Case 2.—A man, aged 20, had a left artificial pneumothorax induced for upper-lobe disease. At the end of a week he noted the "knock." * It was situated in the fourth interspace at the left edge of the sternum. When he first noted it he had had an induction of 200 c.cm. and two refills of 200 and 300 c.cm. respectively.

The artificial pneumothorax space was free except for a band adhesion attached to the axillary region of the upper lobe. This was divided at thoracoscopy in the seventh week,

* The patient first came under my care three months after the induction of his artificial pneumothorax; hence the early part of this case-record has been obtained from the patient and the previous case-notes.

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and a good selective collapse always free from fluid was obtained.

On radioscopy the lung moved considerably on respiration and was very mobile in the pneumothorax space, exhibiting a similar transmitted impulse from the heart and arch of the aorta, and producing a similar rocking movement of the whole lung, as in case 1.

The click was present for seven months, after which it disappeared and, though the patient has been observed for another three months, it has not been detected again.

There has been no obvious alteration in the artificial pneumothorax to explain the disappearance of the sign.

DISCUSSION

The first explanation of the sign was put forward by Morris (1902), who suggested it was due to the squeezing of bubbles of air between the pericardium and the parietal layers of the pleura. (This presumably means mediastinal emphysema.)

Rees and Hughes (1918) suggested that a small column of air, confined to a bronchus by a blood-clot or a foreign body, was set into vibration by the heart's contraction and so produced the sound. This theory was proposed before the relationship of the click to a left pneumothorax rather than to the presence of a foreign body in the left chest had been clearly recognised, and is now therefore only of historical interest.

Smith (1918) discounted pericarditis as the cause on the grounds that the sign was usually present from 24 to 48 hours only and the patients often had no serious symptoms. Further, a patient who came to necropsy had a normal pericardium. Smith further discounted the significance of left intrathoracic foreign bodies, because in one of his patients with the click and a foreign body, apparently in the left chest, a subphrenic abscess developed within two days of the appearance of the sign. The abscess was drained at operation, and the foreign body was found to be in the abscess cavity and not within the chest. He suggested that the click was produced by interstitial emphysema of the lung or the mediastinum. Scadding and Wood (1939) point out, however, that the noises associated with mediastinal emphysema are "crackling noises both in systole and diastole, but quite unlike the sharp clicks heard in our cases of pneumothorax."

Lister's (1928) case had a considerable degree of pneumothorax and a very mobile lung, which received a transmitted impulse from the heart very similar to that observed in the present two cases. He states: "the whole lung, therefore, in a partially collapsed condition hung loose in the thorax suspended from the hilum. It was kept in constant flicking movement by the beating of the heart so that its free lower margin continually agitated the surface of a small quantity of fluid that lay in the costophrenic angle." Because of the character of the sound, its systolic timing, and its point of maximal intensity over the root of the left lung (over the 4th left costal cartilage), he concluded that it arose from partial obstruction of the left pulmonary artery due to distortion caused by displacement of the lung. Thus he regarded it as analogous to the production of sounds heard when estimating the blood-pressure by auscultation.

Lister's theory might possibly explain the click in the present two cases, and some of Barnwell and Greene's cases. Scadding and Wood, however, think that Lister's hypothesis "has nothing to recommend it except its extreme ingenuity." It does appear unlikely that such a small quantity of air as the 25 c.cm., which was sufficient to produce the sign in Scadding and Wood's case 5, would be enough to allow this mechanism to function.

Barnwell (1937), referring to the observations made by Greene and himself, stated:

> "Our observations suggested two possible mechanisms not hitherto considered: (1) the free diastolic fling of the heart against the left diaphragm over a distended hollow abdominal viscus; (2) the uncushioned systolic impact of the heart against the thoracic wall in cases of left pneumothorax."

Mechanism 1 does not satisfactorily explain the early constancy of the sign in the present two cases over periods of eighteen months and seven months, since it would imply that both patients had a constantly distended hollow abdominal viscus. There was no evidence of this in either case. Further, in both cases the click was systolic in time.

If mechanism 2 were correct, the sign would be expected to remain constant in both cases, whereas the feature of both cases now is the variability of the sign. Further, it is difficult to imagine that so small a quantity of air as the 25 c.cm. in Scadding and Wood's case 5 would allow the heart's impact to be uncushioned. This latter difficulty was appreciated by Greene, who regarded the occurrence of the sign in a small pneumothorax as due to mediastinal emphysema.

Scadding and Wood (1939) state:

> "In shallow left-sided pneumothorax, we think the sounds are made by the forcible separation of the visceral and parietal pleuræ during cardiac systole, when the small air-bubble in the pleura is in such a position that it can be moved by the cardiac pulsations—a mechanism similar to that of production of the consonant 't.' This hypothesis explains the presence of the sound only with small pneumothoraces, its disappearance if more air is introduced, and its extreme sensitivity to changes in posture."

Lister's (1928) case, some of Barnwell and Greene's cases, and the present two cases are, however, examples of the sound persisting even when the pneumothorax became larger. Scadding and Wood's hypothesis therefore appears unsatisfactory. It is, however, possible that in certain postures, even in well-established pneumothoraces, the lung can cover the heart sufficiently and in such a way as to form an air-space comparable in nature to the air-space in minimal pneumothoraces. This would enable the mechanism suggested by Scadding and Wood to work.

As an alternative explanation, if the pleural reflexion from the anterior thoracic wall passes sufficiently medially, and thence sweeps laterally over the anterior surface of the pericardium, the heart could become bedded against the anterior thoracic wall in such a way that at each systole there would be a forcible separation of the two pleural layers, which would produce the click.

It seems that, unless the click heard in the presence of a small pneumothorax has a different origin from the click heard when the pneumothorax is of considerable depth, any hypothesis, to be wholly satisfactory, must satisfy the following criteria: (1) it must explain the click not only after small quantities of air have been introduced into the pleural cavity but also in some cases long after a fully effective pneumothorax has been induced; and (2) it must explain why, with no gross alteration in the pneumothorax space, the click should tend to disappear.

The following hypothesis seems to afford a possible explanation: the click is produced by the lingula of the left lung being flipped against the anterior thoracic wall by the cardiac impulse. The sound would then be heard only when the heart and lingula were in such relationship as to allow the heart's impulse to be transmitted in this way. Any factor tending to alter this relationship either by introducing a sufficient volume of lung to act as a cushion between the heart and the anterior thoracic wall, or by removing the lingula from its anterior relationship to the heart, would tend to favour the disappearance of the sign. Thus, the fact that each patient can usually produce the sound by adopting a constant posture and the same phase of respiration for his individual case can readily be explained.

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The introduction of a small volume of air into the pleural space with the patient recumbent would probably allow the flicking of the lingula. The ultimate tendency of the sign to disappear can be explained by the fact that the lung, in long-standing pneumothoraces, tends to lose its elasticity and so alters in shape. It is suggested that this alters the cardio-pulmonary relationship sufficiently for the sign to disappear.

Experiments performed by me on the cadaver have shown that the normal lingula, when it is flipped against the chest wall in an attempt to mimic the transmitted systolic thrust of the heart, produces sounds comparable with pneumothorax clicks.

It is suggested that the consistence of the lung is an important factor in the production of the sound. The radioscopic appearances of the partially collapsed lung in Lister's (1928) case and in the present two cases suggest that the lung in these patients was particularly firm. The description given by Barnwell and Greene suggests that they have observed the same phenomenon in some of their cases.

It appears that, before a satisfactory explanation covering all the facts can be fully substantiated, more cases in which careful radioscopic observations have been made must be reported. It may be possible by careful screening of the patient in various positions to make a complete analysis of the factors responsible for the production of this sign.

SUMMARY

The published cases of clicking pneumothorax are reviewed.

Two new cases are described.

The possible mechanisms of production are critically analysed.

It is suggested that the click is produced, in a free pneumothorax space, by the impact of the lingula against the anterior chest wall, its movement being initiated by the cardiac impulse.

The production of the click in this manner has been confirmed in the cadaver.

I am indebted to Dr. F. Temple Clive, medical superintendent of the British Legion Village, for permission to publish the case-records.

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"... The first thing I saw when I landed was a queue.... The queue system will not work in India, because it contradicts the fundamental basis of society—which is caste.... To see people quietly and without fuss taking their place behind one another and waiting their turn was a profoundly moving symbol of a different basis of society, of the belief that each one counts for one, and of the discipline that had made that belief part of the unconscious attitude of the ordinary man.... Many other things went to confirm that impression. I think the most impressive was the way the rationing system worked.... Coming from the squalor and hunger and misery of India to the incredibly well-stocked shops, the healthy, well-fed children, the security and solidarity of Britain, it was hard to listen patiently to the continual lament that the country was going to ruin because (it generally appeared) one could not get exactly the kind of stockings or tooth-paste one got before the war."—J. E. L. NEWBIGIN, Bishop of Madura, South India, *Christian News-letter*, Nov. 12, 1947, p. 12.

PHOSPHATASE AND BONE FORMATION

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IN 1944 Blum published the results of experiments from which he concluded that healing in experimentally produced bone gaps in rabbits is more rapid if the gaps are filled with phosphatase and calcium glycerophosphate anchored in an alginate gel. He stated that ectopic bone was formed in muscle after the intramuscular injection of phosphatase and substrate in an anchoring medium.

The phosphatase mechanism, as explained by Robison, consists in the liberation of inorganic phosphates from phosphoric esters such as glycerophosphate. This raises the concentration of $PO_4^{\equiv}$ ions, whereby the product of Ca^{++} ions and $PO_4^{\equiv}$ ions exceeds the solubility product of calcium phosphate, which is then deposited.*

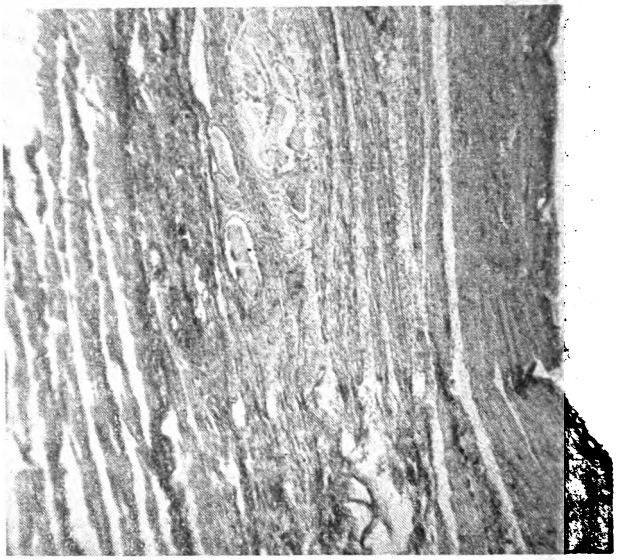

Fig. 1—Photomicrograph of injected muscle of right leg showing degenerated muscle-fibres and cellular reaction but no evidence of bone formation. (×20.)

Such a local deposit of inorganic salt is, however, not bone, which is a living tissue with cellular and organic individuality. Ossification is something more than calcification: it implies complex tissue organisation, with a differentiation of cells (osteoblasts) able to synthesise phosphatase independent of blood circulation. The ability to induce ectopic bone assumes an osteogenetic potential which would confer on phosphatase a more exalted rôle than hydrolysis of phosphoric esters, and if established demands a new conception of its function. Accordingly, it was decided to repeat Blum's experiment of intramuscular injection of phosphatase, using his methods, and if necessary to extend the work.

Large quantities of phosphatase were obtained from the long bones of near-full-time fœtal calves. The phosphatase was kept at 0°C and its activity tested at regular intervals. It remained constant at 100±10 King-Armstrong units per 100 ml. Rabbits were used.

The procedure adopted by Blum was followed faithfully. An injection of phosphatase solution 2 ml., *N*/10 calcium glycerophosphate 1·7 ml. (as substrate),

* In the light of work by J. Roche (*Experientia*, 1946, **2**, 325) and M. J. Dallemagne (*Nature, Lond.* 1946, **161**, 115) this conception of calcification requires modification. Dallemagne considers that in the early stages the freed $PO_4^{\equiv}$ ions do not become attached to Ca^{++} ions but to some organic substance, possibly the pre-osseous matrix. In this tissue, rich in $PO_4^{\equiv}$ ions, tricalcium phosphate is deposited progressively.

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and 2% calcium chloride 0·3 ml., followed by 5% sodium alginate 1 ml., was made into the muscles of the right hind legs of six rabbits. The calcium alginate formed by the last two solutions acted as an anchoring medium. Blum does not state the amount injected intramuscularly, but he injected 14 ml. of solution into bone gaps. It was found, however, that 5 ml. was the maximum which could be retained intramuscularly. A control injection of 5 ml. of solution containing calcium glycerophosphate, water, and anchoring medium was made into the muscles of the left hind legs.

The animals were killed 7–14 and 40 days after operation. Pieces of muscle were removed from both legs around the site of the injection. Part of this muscle was tested for phosphatase activity, and the remainder prepared for histological examination. There was no increased phosphatase in the muscle from the right legs, or any macroscopic or microscopic evidence of either bone formation or calcification. On the right side after 40 days there was some cellular reaction, probably due to the introduction of a foreign protein (figs. 1 and 2).

At this stage some in-vitro experiments were made to test the anchoring power of the calcium-alginate gel. It was found that, if the constituents of the injection made into the rabbits were added seriatim in a test-tube, the alginate did not take up the solution but became a soft ball of jelly lying free in the fluid. Further experiments showed that sodium chloride, glycerophosphate, and phosphatase diffused rapidly out of a homogeneous calcium-alginate gel. The technique for anchoring solutions in the tissues with an alginate, as followed by Blum and tried by us, is clearly open to question. Even if a successful gel were formed in vivo, diffusion of incorporated substances would not be delayed.

To ensure the maintenance of a local concentration of phosphatase over a period, it was decided to insert into the muscle some pellets † containing phosphatase and substrate. One pellet containing 40% freeze-dried phosphatase extract (30+ units in each pellet), 20% calcium glycerophosphate, and 40% lactose with 1% stearic acid was inserted and stitched into a muscular pocket in the right hind legs of six rabbits; and another pellet containing 20% calcium glycerophosphate and 80% lactose with 1% stearic acid was inserted into the muscle of the six left hind legs. The animals were killed 40 days after operation. Both phosphatase and control pellets were completely absorbed. On the right side there was considerable tissue reaction. In three animals large yellow encapsulated masses of lymphocytes had formed. There was no macroscopic or microscopic evidence of bone formation or calcification.

† Made by freeze-drying the phosphatase extract.

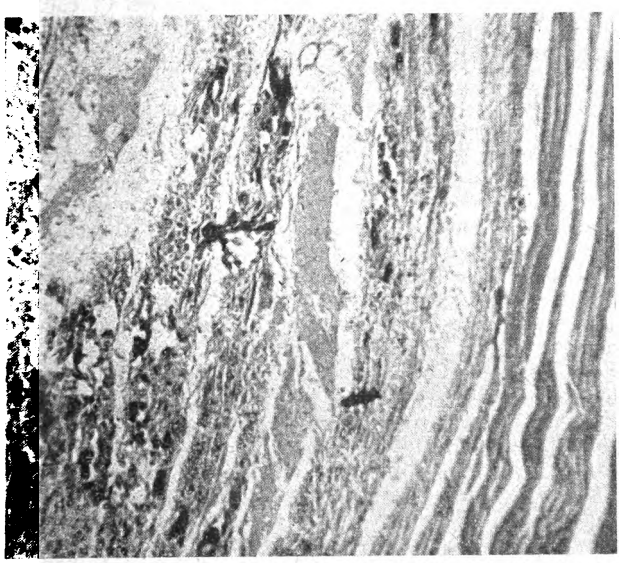

Fig. 2—Photomicrograph of injected control muscle of left leg showing same appearance as in fig. 1. (×20.)

Levander (1938), Annersten (1940), and Lacroix (1945), working independently, have claimed to be able to stimulate bone formation by the injection of a specific osteogenetic substance or substances obtained as "extracts" from bone. Their work, however, requires further confirmation and elaboration.

Our experiments show no evidence that bone formation is stimulated by injection of phosphatase, and discourage any premature departure from the generally accepted views regarding the activity of this enzyme.

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ACUTE SUBDURAL HÆMATOMA
AMENABLE TO SURGICAL TREATMENT

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EXPERIENCE has shown that there are four types of subdural hæmorrhage: (1) late chronic subdural hæmatoma; (2) early chronic subdural hæmatoma; (3) acute subdural bleeding associated with a serious intrinsic injury of the brain; and (4) acute subdural bleeding not associated with a serious intrinsic lesion of the brain.

(1) *Late chronic subdural hæmatoma* is well known. At a variable interval, usually some months, after an apparently trivial injury to the head there develops severe headache associated with bradycardia and drowsiness. Incontinence is a common finding, and the drowsiness fluctuates, the patient being alert at one period and sleepy at another. It is uncommon to find definite localising neurological signs. Signs of increased intracranial pressure may be found on ophthalmoscopy and by lumbar manometry. At the time of injury a vein—usually a superior cerebral vein—ruptures. The resulting hæmatoma becomes enveloped in a fibrinous membrane, which later becomes organised. Later the encapsulated clot begins to swell. This may be due to repeated bleedings or to the fact that the membrane of the hæmatoma is semipermeable; and, as the blood-clot disintegrates, its molecular concentration increases and the osmotic pressure rises. Thus cerebrospinal fluid is drawn into the clot through the semipermeable capsule. Since these hæmatomata are often bilateral, it is wise to explore both sides of the skull, even though a collection is found on the first side explored.

(2) *Early chronic subdural hæmatoma* has the same pathological characteristics as the late chronic. The latent interval between the injury and the development of retrogressive symptoms and signs is usually 7–10 days. Bad headaches, increasing drowsiness, and bradycardia are the cardinal symptoms and signs. Again localising neurological signs are few or absent.

(3) *Acute subdural bleeding with serious intrinsic injury of the brain* is by far the most common group, for some subdural bleeding is usual in severe injuries to the head. At the time of injury the patient suffers diffuse intrinsic damage to the brain associated with local brain laceration. The bleeding comes from torn veins or arteries in the lacerated area or areas. The clinical picture is commonly that of immediate unconsciousness following injury with superadded signs of rapidly advancing cerebral compression. Only rarely is there a lucid interval. The subdural collection consists of a mixture of venous and arterial blood with cerebrospinal fluid, and for this reason a solid clot is seldom seen.

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The major problem here is that of the diffuse neuronal injury, and experience has shown that surgery has little place in the treatment of this group of subdural hæmorrhages.

(4) *Acute subdural bleeding without serious intrinsic injury of the brain* is a very rare type and clinically is indistinguishable from the acute extradural hæmorrhage. A blow on the head is followed by a lucid interval, which in turn gives way to a state of steadily progressive cerebral compression.

It is with this last group that this paper is concerned. Although uncommon, it is an important group, since it falls into the category of surface-clot compressions not associated with serious intrinsic damage to the brain, which means that valuable lives can be saved by timely and correct surgery.

CASE-RECORD

A girl, aged 9 years, was admitted to the neurosurgical unit of the Newcastle-on-Tyne General Hospital, under the care of Mr. G. F. Rowbotham, at 8 P.M. on Sept. 7, 1945.

At 10.30 A.M. on that date she had been struck on the top of the head with a golf ball. She was sitting on a wall at the time, and she remembered the blow and a sensation of dizziness that followed. She would have fallen from the wall had not her companion supported her. In a few moments she felt all right and went off for a walk with her father and made no mention to him of the blow on the head. About an hour after the blow she began to have severe headaches. Her father took her home, her mother put her to bed, and she fell asleep immediately. When her parents went to see her again after lunch they had difficulty in rousing her. A doctor was called in and he sent her into hospital.

On admission 9½ hours after the injury the girl could only be roused with difficulty, but with a good deal of persistence could be made to coöperate in a simple neurological examination. When left alone she dropped off into a heavy sleep.

On examination there was complete ptosis of the left upper eyelid. The pupils, which were contracted and reacted sluggishly to light directly and consensually, were equal. There was no papilloedema. Medial rotation of the left eyeball was limited. When the eyes were inspected with the lids kept open passively by the examiner, there was well-marked spontaneous incoördinated ocular movement. There was no aphasia and no paresis of face, arms, or legs. Both legs were spastic, particularly the right. The right arm was spastic. All the deep tendon reflexes were brisk and both plantar responses were extensor. The superficial abdominal reflexes were diminished and equal on both sides. Temperature 97°F, pulse-rate 68, and respiration-rate 20 per min. Radiography of the skull did not show any fracture.

Undoubtedly the child had an intracranial hæmorrhage and was developing a tentorial pressure cone. The preoperative diagnosis was extradural hæmorrhage. Preparation for operation was made at once; and, when the head had been shaved, a linear bruise 2 in. × 1 in. was seen, lying transversely across the vertex of the skull.

Operation.—At 9.30 P.M., under local anæsthesia, a large left temporal flap was marked out on the scalp and infiltrated with 1% procaine and adrenaline. The anterior and posterior limbs of the flap were opened and two burr holes made in the skull. There was no extradural bleeding. At each burr hole, however, the dura mater was seen to be tense and dark blue. The dura was opened at the anterior burr hole, revealing a dark gelatinous blood-clot, which was difficult to suck out with the electrical suction apparatus. The dura at the posterior burr hole was then opened, revealing a similar clot but only about ⅛ in. thick; hence, when the presenting clot had been removed, the brain, which was swollen and œdematous, herniated gently through the dural opening. Clearly the maximal thickness was over the anterior end of the temporal lobe.

Because of the gelatinous nature of the clot it was obvious that it could not be sucked or washed out. Therefore it was necessary to raise a bone flap. When the bone flap had been turned a clearly defined dark blue area was seen shining through the dura mater and overlying the temporal and inferior parietal regions. Five small dural incisions were then made equidistant from each other, so that the whole area of clot could be covered. Then, by using the sucker and gently breaking up the clot with a blunt dissector at each incision in turn, the whole clot was removed.

The clot was thickest over the anterior part of the temporal lobe, where it was fully 1 in. thick. At each of the dural incisions, after removal of the clot, the swollen brain plugged the opening. During removal of the clot the girl's condition rapidly improved. She became alert, began to talk to the nurses, and showed great interest in her surroundings. The dural incisions were covered with amnion, and the bone flap was not replaced. The temporal muscle was sutured back into place and the scalp closed.

An exploratory burr hole was made in the right temporal region to exclude any possible bleeding on the opposite side, but none was found. Neither on the right nor on the left was there anything to suggest bleeding from the region of the superior longitudinal sinus gravitating downwards over the temporal lobes. Postoperative treatment consisted of dehydration with hypertonic sucrose solution and limitation of fluid intake.

Progress.—Next morning at 9 A.M. the child was conscious and coöperative. There was complete ptosis of the left upper eyelid, with limitation of medial rotation of the eyeball. There was hypotonia of the right arm and leg but no weakness. The right plantar response was flexor and the left extensor.

On the 12th she proved to be a very bright and intelligent little girl. She had a vivid recollection of the blow on her head and the sensation of dizziness following it. She remembered her walk with her father, but from the time she fell asleep at the house she remembered nothing of her admission to hospital or of the operation. Her first memory was waking up in the ward the morning after admission. She was free from headache. The ptosis had almost completely recovered. Eye movements were full and well coördinated, but she complained of diplopia on looking to the right. There was slight unsteadiness of the right arm on the finger-nose test, but power was good. Power in both legs was good; the heel-knee test was well performed, and the plantar responses were both flexor. There was no aphasia.

On the 24th the wound was reopened. The incisions in the dura mater were closed, and the defect in the skull was grafted with tantalum sheet metal. She was discharged on Oct. 11 perfectly well and symptomless. There were no abnormal neurological findings.

COMMENTS

When operating for suspected extradural hæmorrhage it is well to bear this type of subdural hæmatoma in mind and to open the dura mater when inspection of the extradural plane has given a negative result. Especially in the temporal region where the dura mater is thick, it is by no means certain that the greenish or bluish discoloration will be seen in all cases, and the only sure way is to open the dura mater and look. Even in cases in which an extradural hæmorrhage has been found and removed it is important to inspect the dura mater carefully for any alteration in colour and, if any doubt remains, to open the dura; for it is not uncommon for both extradural and subdural hæmatomata to coexist, and it may be that the subdural collection is larger than the extradural one.[1]

SUMMARY

A girl who received a severe blow on the head producing momentary dizziness was perfectly all right for an hour or so after the injury, but then gradually developed severe headaches and became drowsy. The progression of symptoms and signs was that commonly associated with extradural clot formation—the classical middle-meningeal hæmorrhage.

Although no fracture of the skull was seen on radiography, a preoperative diagnosis of extradural hæmorrhage was made, for this type of bleeding occasionally occurs without demonstrable fracture.

At operation the cerebral compression was found to be due to a localised subdural hæmatoma, which, no doubt, had arisen from a ruptured cortical vein at the tip of the left temporal lobe.

I wish to thank Mr. G. F. Rowbotham, neurosurgeon, Newcastle-on-Tyne General Hospital, for permission to treat and publish this case and for guidance in the preparation of the paper.

1. Rowbotham, G. F. Acute Injuries of the Head. 2nd ed., Edinburgh, 1945; p. 138.

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FATAL HYPOGLYCÆMIA IN A DIABETIC

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HYPOGLYCÆMIA is so common in diabetics treated with insulin that this case was thought to be worth recording to demonstrate its potential dangers.

A man, aged 43, had been a diabetic for five years and had been treated with a free diet and protamine-zinc insulin (P.Z.I.) 20 units daily. He had had occasional mild "black-outs."

On May 15, 1946, he suddenly lost consciousness, was treated in another hospital, and was sent home immediately afterwards. On the 20th he had breakfast at 7.30 A.M. and ate nothing more that day, though he did not complain of feeling unwell. At 6.45 P.M., while drinking a glass of beer, he suddenly collapsed and began to have "fits," one every 20 minutes, consisting of violent shakings of his limbs, with momentary loss of consciousness. A doctor gave him an injection of P.Z.I. 20 units and some sugar. The fits lasted several hours, so the doctor was recalled and gave him three tablets and 10 units of P.Z.I. Shortly afterwards the fits ceased, and the patient became unconscious. Next day he was admitted to this hospital.

On admission at 3.15 P.M. on May 21 the patient was found to be lean and dark-complexioned; he was unconscious and could not be roused. Respirations quiet and easy. Nothing abnormal was found in heart, lungs, or abdomen. Blood-pressure 120/70 mm. Hg. Pupils did not react to light; tendon reflexes present and equal; both plantar reflexes extensor. Urine: Benedict's test negative, Rothera's test faintly positive, no pus or albumin. Blood-sugar 45 mg. per 100 ml. Temperature 100°F, pulse-rate 64, and respirations 22 per min.

The patient was given 800 ml. of 25% glucose intravenously over several hours. A momentary lightening of unconsciousness took place after the first 300 ml., but he soon relapsed. Urine now showed Benedict's test + + +, Rothera's test negative.

Later in the evening he showed definite neck-rigidity, a positive Kernig's sign on the right, reduced tendon reflexes, extensor plantar reflex, and positive Oppenheim's test on the left. Lumbar puncture produced a clear colourless fluid, pressure 110 mm.; Queckenstedt positive; 2 lymphocytes per ml.; chlorides 750 mg., protein 40 mg. per 100 ml.

Second Day.—The patient continued in deep stupor, with much general rigidity of neck, limbs, and trunk. Oppenheim's test positive on right. Blood-pressure 108/68 mm. Hg. Rhonchi all over chest, with fine crepitations at lung bases. Blood-sugar at 10 A.M. 187·5 mg.; at 2 P.M. 330 mg.; at 4 P.M. 120 mg.; and at 6 P.M. 133 mg. per 100 ml. Urine contained sugar (on two-hourly testings day and night) throughout the illness. An irregular pyrexia, 99–102°F, persisted throughout, uncontrolled by sulphadiazine or, later, penicillin. He was given glucose 1 oz. four-hourly and soluble insulin 10 units occasionally to combat acetonuria. At this time he could swallow, and responded to cutaneous stimuli by slight movement of the corresponding part.

Third Day.—No change. Rigidity very pronounced. On occasions he opened his eyes, but the blink reflex was absent. Milk feeds with glucose were begun. Blood-sugar at 11 A.M. 250 mg.; and at 2 P.M. 230 mg. per 100 ml.

In the evening he had a sudden attack of dyspnœa and intense cyanosis, with general flaccidity and profuse sweating. The sweating remained prominent throughout the illness. The pulse was almost imperceptible and moist râles were heard all over the chest.

Treatment consisted of oxygen, venesection 15 oz., intravenous instillation of 200 ml. of thrice-normal plasma, atropine, and nikethamide. His desperate condition improved considerably, though the respiration-rate remained high and sweating persisted. He now could not swallow, and was fed through a stomach-tube. During the night he had several attacks of facial spasm, with cyanosis and dyspnœa, lasting a few minutes.

Fourth Day.—Polypnœic. Several attacks of brachial and carpal spasm were treated with 10% calcium gluconate given intravenously. Blood-alkali reserve and blood-calcium estimations were not done, but the urine was strongly acid. Several similar attacks occurred later in the day, in which he was apnœic and deeply cyanosed.

Fifth Day.—In the morning the patient had typical Jacksonian motor fits on the right side. They were controlled with intramuscular soluble phenobarbitone. More of these fits occurred during the night.

Sixth Day.—The stupor seemed less, and the patient tried to mumble something. His fits began again in the evening. Between them the patient showed forced groping in his left hand. The fits were terminated with intravenous thiopentone.

Seventh Day.—"Eye-opening" and forced groping were frequently observed. Response to cutaneous stimuli, which had disappeared on the third day, now returned, with normal tone. The chest was clear, but the pyrexia continued. A catheter specimen showed a cloud of albumin, no pus; culture produced a profuse growth of *Proteus vulgaris* and staphylococci. Blood-urea, determined for the first time, was 178 mg. per 100 ml.

Ninth Day.—Sudden dyspnœa and cyanosis. Cheyne-Stokes breathing ensued, and the patient's condition rapidly deteriorated. Blood-urea 247 mg. per 100 ml. He died in deep coma at 6 P.M.

Necropsy.—Body much wasted. Lungs: severe congestion of right lower lobe; congestion and bronchopneumonia of left lower lobe. Pancreas: no gross abnormality. Kidneys: subcapsular dilatation of fine blood-vessels. Brain: punctate hæmorrhages in subcortical region; no œdema.

Histology.—Pancreas: in two portions examined only one islet could be found, and many of its cells showed hyaline degeneration; some of the small ducts showed considerable fibrous thickening of the walls, but their lining epithelium looked normal. Liver normal. Kidney: considerable dilatation of blood-vessels. Unfortunately the brain could not be examined adequately owing to unsatisfactory fixative (formol-saline).

DISCUSSION

Murphy and Purtell (1943) collected 26 reported cases of hypoglycæmic shock in diabetics, 8 of them fatal. The periods of shock varied from a few hours to ten days. Of the 18 patients who recovered, 16 showed various degrees of cerebral damage on recovering consciousness, mainly mental deficiency or retardation or neurological symptoms, chiefly aphasia or hemiplegia. According to Murphy and Purtell the hypoglycæmic state falls into three stages: (1) confusion, irritability, and restlessness; (2) profuse perspiration, increased confusion, and sometimes convulsions, followed by stupor and coma, or, in other cases, by overactivity shown by agitation, excitement, or delirium; and (3) deep coma, with convulsive phenomena and motor disturbances. An attitude of decerebrate rigidity may follow. In many cases disturbances of consciousness without coma or motor activity were outstanding. These included delirium, catatonia, hysteria, and partial or complete unconsciousness. No characteristic histological changes have been described. There was much evidence, however, of widespread cerebral damage. The likeliest mechanism is that brain cells are damaged by carbohydrate deprivation.

Baker (1939) discussed cerebral damage in hypoglycæmia, including insulin shock in diabetics. He concluded that repeated hypoglycæmia may definitely depress cerebral function, and even produce irreversible degeneration of brain tissue and cells, leading to long-continued or permanent functional damage or death.

Roche (1942) described 2 cases of fatal hypoglycæmic coma in diabetics, one of which lasted seven days and the other eight hours. He concluded that the use of P.Z.I. adds seriously to the gravity of hypoglycæmic coma when established, and suggested that exposure to shock and strain may be a factor in its development.

In the present case coma lasted nine days. The main features can be summarised as follows:

(1) Disturbed cerebral function shown by varying depth of loss of consciousness, general rigidity at first, followed by Jacksonian fits and forced groping, ending in deep coma.

(2) Continuous pyrexia, with raised respiration-rate (22–50 per min.) and pulse-rate (100–138 per min.), and profuse perspiration.

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(3) The urine was acid to litmus throughout. On admission the Benedict test was negative; subsequently it was orange in most of the tests, and it was never negative. Acetone (Rothera test) was mostly absent, but on the second and fourth days after admission there were moderate amounts of acetone about midday, and in a few other tests a trace of acetone was present. Albumin was present as a cloud (boiling test) on the last three days of the illness.

(4) High terminal blood-urea level.

It seems likely, in view of Marriott's (1947) work on salt and water depletion, that the terminal circulatory failure with rising blood-urea was the result of salt depletion produced by persistent sweating during the last six days of coma.

CONCLUSIONS

Hypoglycæmia is a potentially highly dangerous state. If it continues for a long time, cerebral damage ensues, and possibly death. If recovery takes place, permanent mental damage is likely.

Early and accurate diagnosis and immediate treatment are vitally important, especially when P.Z.I. or presumably any other long-acting insulin is used.

Insulin must be used with the dangers of hypoglycæmia in mind.

I wish to thank Mr. Douglas G. Martin, F.R.C.S.E., medical superintendent of St. Richard's Hospital, for his advice and encouragement; and Dr. C. J. Harwood Little, O.B.E., for his kindness in providing a histological report on unsatisfactory material.

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Reviews of Books

Chronic Structural Low Backache

R. A. ROBERTS, M.B., B.SC., D.M.R.E. London: H. K. Lewis. 1947. Pp. 105. 45*s*.

IN the first section of this rewarding book there is a detailed clinical account of 64 cases of low back pain, with reproductions of the X-ray findings. Dr. Roberts is particularly interested in the pars interarticularis of the lumbar vertebræ, the isthmus between upper and lower articular processes, and in the radiographic appearance of a translucent cleft in this region which is usually regarded as a congenital spondylolysis and a possible precursor to actual spondylolisthesis. In his view the lesion is not congenital but a stress effect exactly comparable to fatigue fracture in the long bones; and some of his fascinating pictures show what he interprets as reactive ossification processes taking place after such a yielding of the arch. If this view is correct, the prolapsed intervertebral disc will lose some of its ubiquity as the cause of low back pain, and we should rather think in terms of the stress of body-weight producing changes in the lumbar spine of which disc prolapse, isthmic yielding and possible spondylolisthesis, and malformation and arthritis of the intervertebral joints are all part. Dr. Roberts believes that œdema accompanying the stress fracture may in itself cause nerve-root irritation and diffuse low back pain, as well as abdominal symptoms and visceral upsets due to sympathetic stimulation.

The second section of his book is an impassioned plea for the proper care of sufferers from chronic structural backache, who are too often, he says—above all in the Services—regarded as neurotics and malingerers with nothing to show for their symptoms. Even if an organic lesion is suspected, the allocation of back and belly to posterior and anterior clinicians respectively means that the spinal origin of many abdominal troubles will be overlooked. Whatever may be felt about some of the more speculative opinions expressed, this record of careful investigation is a good example of private clinical research.

Delayed Union in Fractures of the Long Bone

KENNETH W. STARR, M.S. Melb., F.R.C.S., F.A.C.S., F.R.A.C.S., surgeon, Sydney Hospital, New South Wales. London: Butterworth. 1947. Pp. 215. 42*s*.

THIS book is an expansion of the author's Jacksonian prize essay on delayed union in fractures of the long bones. In three scholarly and well-documented sections Colonel Starr deals first with the morphogenesis of bone, next with the physiology and pathology of fracture healing, and finally with the causes and treatment of delayed union. The wealth of reference does not obscure his own preferences and prejudices, and the book as a whole is no primer but a reflective surgeon's account of his experiences. Particular emphasis is laid on the importance of the most extensive and thorough drilling of compact bone, above all in the tibia, whenever this has been stripped and laid bare by injury or operation. Avascular bone acts as a foreign body in the wound, but drilling allows permeation by blood and soft tissues and thus combats both infection and delayed union; bone grafts should be similarly treated. Compound fractures may be plated if unstable, and plastic skin closures of the Estlander type used by Gillies are advocated and described for extensive soft-tissue loss. Intermittent venous congestion is regarded as valuable in promoting union. An appendix gives details of some of Colonel Starr's war cases.

Smoke: the Problem of Coal and the Atmosphere

ARNOLD MARSH, M.SC. TECH., M.INST.F. London: Faber. 1947. Pp. 306. 21*s*.

MOST people must be aware that there is a "smoke problem," without realising its magnitude and importance. This book gives a detailed and vivid picture of the destruction caused by smoke to buildings, monuments, plants, trees, and health. Smoke's effect is insidious and often unnoticed, but the figures given here are unanswerable. More than this, the book by its restraint and lack of emotional appeal inspires in the reader a passionate wish that more were done to diminish the menace. The author shows how smoke used to be regarded with aversion, then with tolerance, and is now accepted as an inevitable part of a town. Almost every page contains startling and intriguing facts which should be quoted in a review; but there is space enough only to urge as many people as possible to read this book.

Physiology of Man in the Desert

E. F. ADOLPH, PH.D., associate professor of physiology, University of Rochester, and his associates. London: Interscience Publishers. 1947. Pp. 351. 39*s*.

THIS recapitulation of the work of the Rochester Desert Unit is chiefly a study of acute dehydration in man, and reports observations on some of the physiological stresses imposed by a desert climate. Measurements are given of the insolation load and of the value of clothes in protecting against convective heat gain. Acute dehydration develops when water lost in sweat is not replaced; and the authors followed the physiological adjustments to thermal and circulatory stresses thus produced to the point where they broke down during "hikes to exhaustion" in the Colorado desert and in laboratory hot rooms. But only short sorties into the desert, and the emergency of being stranded waterless, are considered; the problems of living for months in such a climate, with the chance of developing chronic maladjustments, are not discussed. The importance of salt is played down, and detailed recommendations for salt intake are not given. Clinical effects of heat are dealt with in two pages and dismissed with the dictum that a differential diagnosis between heat stroke, heat exhaustion, and heat cramp is unnecessary, since all—the authors consider—are due to water-lack. The unit was "unable to demonstrate," even in the wet tropics, "that Relative Humidity adds to thermal stress." The problem of unevaporated wasted sweat, and the resultant prickly heat, is ignored. The book is presented solely as a series of original observations by one team, but it is a pity that these reports were not made the skeleton for a much fuller critical review. The transposition, on pp. 162 and 163, of figs. 10–1 and 10–2, if not noticed, seriously compromises an otherwise good argument.

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THE LANCET

LONDON: SATURDAY, FEB. 7, 1948

Early Diagnosis of Tuberculous Meningitis

THE introduction of streptomycin has basically changed the approach to tuberculous meningitis. Since ROBERT WHYTT recognised its incurability nearly 200 years ago, the diagnosis had been equivalent to a death sentence. The chances of streptomycin leading to recovery without serious permanent sequelæ are still unknown and are probably not good; but there is a vast difference between treating a patient who is certain to die whatever is done and treating one with a remote chance of recovery with active treatment. Formerly early diagnosis had not been of great importance, except to the doctor's reputation; today detection in the prodromal stage, before the onset of neurological signs, may well be vital. The few clinical trials with streptomycin have shown that it is the cases with a short history and minimal signs in the nervous system which are most likely to derive benefit, as the natural course of the disease would lead one to expect. Two complications common in unmodified attacks will militate against a favourable outcome in the treated case: these are obstructive hydrocephalus,[1 2] and softening of the brain as a consequence of occlusive disease of the meningeal and cerebral vessels.[1] If streptomycin is to achieve restitution to normal, treatment must be begun before such irreversible structural alterations in the brain have occurred.

Tuberculous meningitis is commonest in the first decade of life, so it is in young children that particular watch must be kept for early signs. In the known tuberculous child with obscure symptoms, spread to the meninges must always be in the doctor's mind. WALLGREN [3] has shown that the incidence of meningitis is highest in the first three months after the development of the primary lesion, and that the risk of this complication is greater the younger the child. Children exposed to tuberculosis at home must be kept under close scrutiny both for the beginning of their primary infection and for subsequent dissemination to the nervous system; and the practitioner faced with a suspected case of tuberculous meningitis should look and inquire carefully for open pulmonary tuberculosis in the family circle. The presenting features of tuberculous meningitis are many and varied, but most cases conform to a general pattern of symptomatology. Rarely the onset is sudden, with focal signs in the nervous system such as cranial-nerve palsies, limb paralyses, or focal or generalised convulsions. More often the meningitis begins insidiously, with symptoms which may at first mimic minor ailments. Sometimes the malady appears in an apparently normal child; in other cases a careful history discloses that before the more tangible manifestations appeared the child was vaguely "off colour" or "out of sorts." This indefinite phase of the illness may be related to the development of the primary lesion or to the subsequent hæmatogenous spread. In infancy and early childhood fretfulness, drowsiness, loss of appetite, pallor, failure to thrive, or sometimes fever and constipation may bring the patient to the doctor. If these non-specific symptoms happen to coincide with the first dentition the mother will almost certainly attribute them to "teething," and her medical adviser may be tempted to agree without further investigation. When later the diagnosis has to be drastically revised it may be too late. The disease tends to be most treacherous in this age-group, with a more vague onset and a more rapid progress than is usual in the older patient. Focal signs in the nervous system or generalised convulsions may then be the first indication of intracranial mischief. In the early years of life meningism is late in appearing and hard to detect—fullness or bulging of the fontanelle, or early papilloedema, may then be the first belated indication that all is not well within the skull. In older children listlessness and irritability may be the first symptoms; an otherwise good-natured and happy child loses interest in his toys or games and becomes fractious with his playmates. The parents may remark that he is easily tired; the child comes home from school and unaccountably falls asleep in the chair or across the table at mealtimes. Such symptoms often lead on to a dreamy state in which the patient resents or even resists interference. Headache in some form is a common complaint in the older child during the prodromal stage of the illness, and vomiting commonly parallels it in time and intensity. Fever, loss of appetite proceeding to complete anorexia, and constipation are fairly constant complaints at this stage, and in some cases loss of flesh may be noted. Admittedly, these are all indefinite and vague symptoms, and when there is a coincidental infection of the upper respiratory tract or middle-ear cleft their true significance may at first be overlooked.

During the difficult prodromal stage a positive skin test may give a valuable lead. In domiciliary practice the test may be accomplished simply and speedily by using tuberculin diagnostic jelly or the Vollmer patch. The fundi, too, may throw some light on the problem: choroidal tubercles, though not pathognomonic of meningeal involvement, are at least an indication of hæmatogenous dissemination, and when associated with signs of meningeal irritation they clinch the diagnosis of tuberculous meningitis. Once tuberculous meningitis is suspected, the patient should be promptly admitted to hospital. Here radiography of the chest, full examination of the spinal fluid, and an intradermal Mantoux test should be performed at the earliest opportunity, for their results taken together may afford convincing evidence where confirmation from the spinal fluid alone is not possible. A positive tuberculin test is found in almost all cases of tuberculous meningitis, anergy only developing occasionally in the terminal stages of the disease. In hospital, when dealing with the urgent case, the intradermal Mantoux test is the method of choice for eliciting skin sensitivity, and it is justifiable to use the 1:1000 dilution of Old Tuberculin in the first instance, accepting the occasional risk of a severe reaction. Lumbar puncture typically reveals a clear or slightly opalescent spinal fluid under

1. Smith, H. V., Daniel, P. *Tubercle*, 1947, 7, 64.
2. Lincoln, E. M. *Amer. Rev. Tuberc.* 1947, 56, 75.
3. Wallgren, A. *J. Pediat.* 1934, 5, 291.

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increased pressure; compared with tap water in a similar container the specimen often has a faint yellow tinge.[4] An initial cell-count usually shows a moderate pleocytosis in which the predominant cell is the lymphocyte. Polymorphs may be present in small numbers; sometimes in the early case they may form a substantial proportion of the total white cells, the proportion declining as the disease progresses. Commonly the case presents as a lymphocytic meningitis, and the differential diagnosis is from the several other conditions which can give rise to this picture.[5] In children the diagnostic possibilities can be narrowed down and usually rest between tuberculous meningitis, a virus meningitis, and possibly the serous tuberculous meningitis recently described by LINCOLN.[2] Chemical analysis of the spinal fluid offers the best means of differentiation between these three conditions. In tuberculous meningitis a progressive fall in the sugar and chloride values is a frequent though not invariable finding, whereas in the neurotropic virus infections the levels are unaltered. In serous tuberculous meningitis the chemical composition of the fluid, including the protein, remains normal in the face of an increase in pressure and a rise in the number of lymphocytes. In the past too much attention has been focused on the chloride content of the fluid, which in the early case may not be significantly lowered. A low and falling sugar value is likely to be of greater diagnostic help in the early stages.[2 4] Sugar estimations, to be accurate, should be done within ten minutes of withdrawing the fluid, and where this is not practicable a "sugar-preserving fluid"[6] should be used. In experienced hands a long and diligent search in stained smears of the clot or the centrifuged deposit usually reveals the tubercle bacilli, but their absence will not exclude the diagnosis. Moreover, while it is obviously desirable to have bacterial confirmation from the film before starting treatment, streptomycin should not be withheld for more than 48 hours when the other diagnostic findings, in the fluid and elsewhere, provide strong presumptive evidence of tuberculous meningitis. But cultural and biological tests should still be performed on pre-treatment specimens of the fluid, to confirm the diagnosis. The long-continued administration of streptomycin is not to be undertaken light-heartedly; so, while every effort must be made to detect and treat the disease in the early significant phase, the selection of cases for streptomycin treatment should still be based on strict criteria.

4. Merritt, H. H., Fremont-Smith, F. *Arch. Neurol. Psychiat.* 1935, **33**, 516.
5. *Lancet*, 1947, **i**, 487.
6. King, E. J. Micro-Analysis in Medical Biochemistry. London, 1946; p. 21.

Germ Layers

THE germ layers have only two opportunities to influence the medical man's career: when he is a pregastrula larva and when he is a preclinical student. The student learns the classical germ-layer theory in something like the following form: (*a*) between the blastula and gastrula stages of its development, the chordate embryo comes to be organised into a system of three epithelial sheets, or germ layers, the ectoderm, mesoderm, and endoderm; (*b*) each of the several tissue systems of the body derives from one, and only one, of these; and (*c*) with rare exceptions (the notochord being sometimes rather tiresome) the same tissue system is derived from the same germ layer in all chordates.

That the germ layers are anatomical entities, which is all that the first statement affirms, is not to be denied; but an appraisal of the part they play in embryogenesis had to wait upon the fundamental discoveries of CARL VOGT.[1] By a simple and beautiful technique of vital staining VOGT showed that gastrulation is brought about by the movement of cells relative to one another—by slidings, foldings, stretchings, streamings, convolutions, and deformations—and not, as many embryologists (following HIS) had until then believed, by the cells in different parts of the embryo dividing at different rates. It is now generally accepted,[2] therefore, that the germ layers have a tactical rather than a strategic significance in early development—the germ layers are "the embryo's method of sorting out its constituent parts"[3]; "the true significance of the classical 'germ layers' is simply that the strategical objective of early development can only be secured by the deployment of cells in epithelial sheets."[4] VOGT's technique has made it possible to work out "fate maps" for the blastula larvæ of most chordate types; that is, maps showing where the various parts of the blastula are going to end up when gastrulation is complete, or (to make our metaphor earn its keep) charts showing the disposition of cell groups on the eve of the greatest manœuvre of chordate development. *This* part of the blastula, we can now say, is "presumptive notochord," because the cells we have stained (or their derivatives by fission) are going to form part of the notochord of the future embryo; *that* part is presumptive epidermis or presumptive brain. The important thing is that each presumptive area is a single territory enclosed within a single continuous outline. All the presumptive epidermis is in one place, all the presumptive neural tube is somewhere else. Patchworks do not occur. It is therefore not surprising to find that the coherence or connectivity of the presumptive areas is preserved in the form of germ layers during the gastrulation manœuvres. And the general similarity between the germ layers of the several chordates is also expectable when we remember that the outcome of these manœuvres is much the same in all chordate groups. During gastrulation the embryos of chordates are getting more, not less, alike. Starting from very different beginnings—compare a frog's egg with a hen's or human being's—chordates come to resemble each other more closely as gastrula larvæ than at any time before or after.

This uniformity of the germ layers is the general rule, but it is not obligatory. Experimental embryologists have proved that by the appropriate manipulations ectoderm may be caused to turn into mesoderm[5] and vice versa,[6] and that there is no time at which mesoderm and ectoderm are irreversibly differentiated as such. Either they are undifferentiated and plastic, or they are differentiated to form particular specific tissues, such as the epidermis or the neural plate. There is no intermediate stage in which they can form

1. Cf. Spemann, H. Embryonic Development and Induction. London, 1938.
2. Holtfreter, J. *J. exp. Zool.* 1943, **94**, 261; 1944, **95**, 171.
3. Oppenheimer, J. M. *Quart. Rev. Biol.* 1940, **15**, 1.
4. Medawar, P. B. *Proc. roy. Soc.* B, 1944, **132**, 133.
5. Mangold, O. *Naturwissenschaften*, 1925, **13**, 213. Waddington, C. H., Taylor, J. *J. exp. Biol.* 1937, **14**, 335.
6. Lopashov, G. *Zool. Jb.* 1935, **54**, 299. Töndury, G. *Arch. EntwMech. Org.* 1936, **134**, 1.

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any mesodermal tissue but only mesodermal tissue. DE BEER [7] has now conclusively shown that the classical integrity of the germ layers is refuted as clearly by normal development as by experimental means. In amblystoma (salamanders) pigment granules occur only in cells of ectodermal origin, while large yolk granules never occur in these cells. Yet pigmented cells appear among odontoblasts and in visceral cartilage, and the enamel organs of the teeth may be formed from endodermal or ectodermal cells, or from both. These are facts that should be concealed, as PYTHAGORAS is said to have concealed from the lay public the existence of incommensurable numbers; for they are fatal to the germ-layer theory in its classical form.

It is clear, then, that the terms of reference of the germ-layer theory are a good deal narrower than the great VON BAER imagined when he formulated it. Germ layers are now thought to be of mechanical and functional rather than merely anatomical significance; and their integrity through the evolutionary series, such as it is, is derived from the connectivity of the presumptive areas on the one hand and the uniformity of the chordate gastrula larva on the other. But these modern misgivings and qualifications can do nothing to depreciate the historical importance of VON BAER'S concept, on which classical comparative embryology was founded. It could indeed have been better founded on a knowledge of fate-maps and morphogenetic movements, and on this foundation it is now being rebuilt. DE BEER reminds us that the germ-layer theory has its echoes in histological classification, and warns us that the classification of tumours by germ-layer origins cannot but mislead. But one may doubt if this particular way of classifying tumours goes deep enough, or is taken seriously enough, to make its elimination a first demand on terminological hygiene. The first, surely, is to rid histology for ever of that pompous neologism, the word "mesothelium." It seems to have been coined in the naïve belief that "endothelium" means, or ought to be made to mean, a cell layer of endodermal origin. The truth, of course, is that an endothelium is an inner lining, the boundary of a concave surface, while "epithelium" (doing duty also as the generic term) means an outer lining, the boundary of a convex surface. "Mesothelium," being based on a misconception of the terms of reference of an obsolete theory, can now perhaps be formally laid to rest.

Acquired Resistance to Antibiotics

To parody an old saw, some bacteria are born resistant to streptomycin, some acquire resistance during treatment of a clinical infection, and some have resistance thrust upon them by artificial cultivation in the test-tube. It is with the second of these states that the medical man is particularly concerned, the more so as bacteria which initially are sensitive to streptomycin seem to acquire resistance to the drug quickly and easily. This tendency has been particularly noticeable in the treatment of coliform infections of the urinary tract; so if complete sterilisation of the urine is not attained within 1–3 days it is fairly certain that a resistant variant has become predominant. It has also been noted during the treatment of meningitis due to *H. influenzæ*, and in other infections; but the big problem is the development of streptomycin-resistant tubercle bacilli during long-continued treatment in pulmonary tuberculosis. American workers have noted that streptomycin-resistant strains of tubercle bacilli are detectable by routine in-vitro tests after periods ranging from 35 days onwards, and these strains may be resistant to high concentrations of streptomycin (1000 μg. or more per ml.). The investigation sponsored by the United States Veterans Administration, Army, and Navy [1] showed that strains resistant to 20 μg. or more of streptomycin per ml. developed in 39 of 62 patients (63%) within eight to twelve weeks of the start of treatment; and the remark is made in the report that the development of streptomycin resistance is serious, and altogether too little is known of its genesis, significance, and incidence. If streptomycin becomes more widely used in the treatment of tuberculosis, and if a large proportion of strains in treated cases develop resistance, the wide dissemination of resistant tubercle bacilli may be a grave handicap to successful streptomycin therapy.

New light on the genesis of streptomycin-resistance has been shed by an investigation at the Mayo Clinic [2] designed to determine on a quantitative basis the development of streptomycin-resistant tubercle bacilli. From 8 patients with pulmonary tuberculosis and strongly positive sputum who were subsequently treated with streptomycin for four to five months, 24-hour specimens of sputum collected at weekly intervals were homogenised and inoculated on to plates of Herrold's egg medium containing concentrations of streptomycin ranging from 0 to 1000 μg. per ml. The plates were incubated at 37°C and examined weekly, and the number of colonies of tubercle bacilli which developed was noted. In 7 of the 8 cases a few colonies of tubercle bacilli resistant to 5 or 10 μg./ml. streptomycin were observed even before streptomycin therapy was begun, but in 2 cases where a comparison could be made with the number of colonies on streptomycin-free plates it was estimated that the ratio of resistant to sensitive strains before treatment was in the region of one to many thousands. The great bulk of organisms were inhibited by 1–2·5 μg. per ml., and this finding was confirmed by showing that 50 discrete colonies picked from one plate and tested by the usual fluid method were all sensitive to streptomycin. During treatment the strains from 4 of the 8 cases became highly resistant to streptomycin (1000 μg./ml. or more); 1 strain became resistant to 50 μg.; 1 to only a few μg.; and 2 never lost their original sensitivity. In the 4 cases in which tubercle bacilli became highly resistant weekly cultures on Herrold's plates showed a gradual increase in the number of resistant tubercle bacilli and in the degree of their resistance. The increased resistance began within one to four weeks but was not predominant until six to thirteen weeks from the start of treatment. Thus, in one case before chemotherapy 1 in 88,750 tubercle bacilli was resistant to 10 μg.; after two weeks' treatment 1 in 13,174 was resistant; at three weeks 1 in 817; at four weeks 1 in 588; and at five weeks 1 in 367. By this time colonies were

7. de Beer, G. R. *Proc. roy. Soc.* B, 1947, **134**, 377.

1. Report to Council on Pharmacy and Chemistry. *J. Amer. med. Ass.* 1947, **135**, 634.
2. Pyle, M. M. *Proc. Mayo Clin.* 1947, **22**, 465.

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growing on media containing 100 μg. per ml. but the bulk of organisms were still streptomycin-sensitive. Throughout the study it was noted that the drug-resistant strains grew more slowly and developed smaller colonies than the strains on the plain medium, which might suggest that even when strains are becoming resistant to streptomycin there is still considerable interference with their vitality. Later, however, as strains became more resistant they developed almost as quickly and profusely on the streptomycin medium as on the plain medium. This study therefore confirms the view that development of streptomycin-resistant tubercle bacilli is associated with the natural selection during treatment of the few resistant variants initially present. It also shows that whereas the usual method of testing for streptomycin-resistance indicates a sudden change from sensitivity to resistance, in actual fact the change is very gradual; so clinical response to therapy may still be expected—as has indeed been noted—after the infecting strain has apparently become resistant.

The position seems to be similar in the penicillin therapy of staphylococcal infections, where the few naturally resistant staphylococci (resistant because they produce penicillinase) gradually replace the bulk of sensitive strains, as is suggested by BARBER.[3] Further, her finding that an increase in the size of the inoculum may raise the in-vitro resistance of staphylococci 800-fold is possibly explicable on the same basis, and this is an important technical point to laboratory workers engaged in testing the sensitivity of bacteria to penicillin or streptomycin.

How the dangers of acquired drug-resistance are to be overcome is still conjectural. Massive dosage at onset in acute infections, intermittent therapy for chronic infections, and combined therapy with two drugs have all been suggested. Lately VOUREKA[4] has described an apparently new phenomenon—the reversal of resistance to sensitivity by "sensitisation" with other bacterial cultures or their filtrates. She offers no explanation of this occurrence—whether for example the sensitising agent adsorbs the resistant strains, or whether sensitised staphylococci lose their capacity to produce penicillinase—but her work certainly opens up a new field for the investigation of this troublesome property of bacteria.

3. Barber, M. *J. Path. Bact.* 1947, 59, 373.
4. Voureka, A. *Lancet*, Jan. 10, p. 62.

Annotations

APPEAL TO THE COURTS

A SPECIAL correspondent's article in last Saturday's *Times* must give further pause to those of us who have argued that doctors in the National Health Service would have more security if complaints against them were heard in the law-courts.

After pointing out that "the doctor in any form of public service deserves special protection against hasty criticism or local prejudice," the correspondent describes the protection now given in the National Health Insurance scheme. Here any serious case is referred by the local insurance committee to the Ministry of Health, where an inquiry committee, consisting of two doctors and a practising lawyer appointed by the Minister, reports on the facts and inferences of facts it believes to be established. The report then goes to an advisory committee consisting of three doctors from the Minister's staff and three retired or practising insurance practitioners selected from a panel, and the Minister makes his decision after hearing its recommendations and after inviting the doctor to submit evidence as to his character and professional standing. Between 1924 and 1947 successive Ministers have had to take decisions in 46 cases: 18 doctors were formally excluded from the service and 12 were allowed to resign; and of those who later applied for reinstatement only 3 have been refused.

Though most of the N.H.I. disciplinary machinery is retained in the National Health Service, the Minister has given up his right to terminate a doctor's contract, and this power is now vested in a tribunal consisting of a lawyer of at least ten years' standing (nominated by the Lord Chancellor), a layman, and a doctor chosen from a panel.

> "Before this tribunal," writes the *Times* correspondent, "the doctor will enjoy an unusual privilege. If the tribunal decides in his favour it cannot be overruled. The initiator of the complaint has no right of appeal. But if the decision goes against the doctor he, and he alone, has the right to appeal to the Minister, and the Minister may then overrule the tribunal. . . . Thus the only power which the Minister retains is a power to protect the doctor against an adverse decision, a power not of dismissal but of retention in the service. When such an appeal is made to the Minister Mr. Bevan has indicated that it will probably be dealt with in accordance with current N.H.I. procedure: the doctor would have the right to an oral hearing, in public if he wished; and the report of the appeal proceedings would be referred to the Minister's medical advisory committee for its recommendations before the Minister decided whether to risk retaining in the service a doctor whom the tribunal wanted to discharge."

The law-courts are open to the doctor, as to any other citizen in comparable circumstances, if he claims that at any stage the various bodies concerned have failed to comply with the conditions that must precede termination of his contract. In proposing that he should be able to appeal to the courts against the decision of the tribunal or the Minister, representatives of the profession are asking for something more than this "elementary right of appeal to the courts," which is in fact preserved under the Act. They are asking that the court should be able to override a lawful decision of the tribunal or the Minister; and if it were granted to the doctor this right to appeal against a decision (because it is unduly severe or inexpedient) could not possibly be denied to the complainant. In many cases the doctor, whether successful or unsuccessful in his case, would find privacy an advantage; but with an appeal to the courts any complainant would have it in his power to expose him to public proceedings. Important as this might prove in practice, even more weight, however, must be attached to the Minister's legal arguments summarised in the *Times* as follows:

> "In all such cases . . . the courts would be in the highly embarrassing position, not of applying the law, but of participating in managing the service; of deciding, not whether the tribunal's decision was lawful but whether it was wise. If the principle were conceded it would imply that anyone aggrieved by the *lawful* termination of his contract of service, whether a professor of medicine, a newspaper editor, a nurse, a miner, a teacher, or the assistant of a general practitioner, would be able to ask a court to order his reinstatement on grounds not of right but of expediency. The courts would be obliged to interfere with the general responsibility of managers for the efficient conduct of services and enterprises of every description."

The *Solicitors Journal* of Jan. 31 suggests that this question of appeal to the courts might be referred to the legal committee which is to consider whether partnership agreements will remain valid after the appointed day.

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FATALITIES FROM TRIDIONE

IT is a recognised drawback to the use of tridione in epilepsy [1] that its effective control of petit-mal attacks is often offset by toxic manifestations, of which photophobia and rashes are the most common but a rare and devastating effect on the blood-forming organs is the most serious. An inquest at Stockport a fortnight ago, and a report on the death of a child at a Redhill hospital,[2] have given two timely reminders of these risks of using tridione. In the latter case a boy of eleven had been taking the drug for about seven weeks. On the 25th day he had a transient urticarial rash and on the 51st day he developed gingivitis and pyrexia. Tridione was stopped, but he died three weeks later. In life his white-cell count was only 800 per c.mm., all the leucocytes being of an immature mononuclear type. Necropsy showed complete aplasia of the granulocyte precursors in the bone-marrow. The Stockport inquest concerned a girl of nine who had been taking tridione for four weeks. She developed a rash, was readmitted to hospital, and died in seven days of a "disease of the blood." The coroner suggested that the doctor might have warned the mother to be on the lookout for a rash as a possible sign of serious trouble. In Braithwaite's view [2] a rash, lymphatic enlargement, or redness of the gums should act as warning signals to the practitioner; and to these one might well add unexplained pyrexia. But 2 other fatalities that have been recorded at length,[3] taken with the paper by Davis and Lennox [4] on the effect of tridione on the blood, leave no doubt that every patient receiving tridione should have a total and differential white-cell count at regular intervals, so that disease processes will be detected in time to be reversed by stopping the drug; and it would be well if this precaution was plainly set out in the literature supplied with the capsules. The Stockport case, however, suggests that the interval between examinations should be less than the month proposed by Davis and Lennox. Further fatalities may lead to the abandonment of the drug, and this would be a misfortune for the many children who depend on it for freedom from attacks. In any case the coroner's jury at Stockport were clearly right in recommending that tridione should be forthwith scheduled as a poison.

THE AMPHETAMINE-EATERS

THOSE whose curiosity leads them to take a 'Benzedrine' inhaler to pieces will find inside a small rectangle of impregnated paper, folded into eight sections. Monroe and Drell [5] report that the inmates of an American military prison chew these "strips" as a convenient source of amphetamine and that this is a common habit among other military personnel and civilians. In the first place it was noted [6] that episodes of "marked intoxication," with vomiting and abdominal pain, were occurring among the prisoners without the usual biochemical findings of alcoholic excess. Investigation revealed that about a quarter of the prison population were more or less habitual amphetamine-eaters. Monroe and Drell admit the likelihood of error in assessing the frequency of any drug habit, but their estimate, based on a questionary, is supported by circumstantial evidence. A large number of inhalers and their contents were found when the prison was searched. In one guard's room over 300 empty containers were found, and interrogation established that the inhalers had a fluctuating scarcity value. It was also learnt that sales of inhalers by local druggists had become exceptionally high.

Each inhaler contains about 250 mg. of amphetamine base, so one section or strip of the impregnated paper represents about 30 mg. With ordinary inhalation very little amphetamine is absorbed—Simpson and Simon [7] computed that an average of 21 inhalations were necessary to draw off 1 mg. of amphetamine base from the inhaler, and in practice a proportion of this must be lost by exhalation. Waud [8] obtained gross effects, but only by continuous inhalation through two inhalers for four to six hours. The prison habitués commonly dip one or more strips in coffee and then chew or swallow them. Although the comparative pharmacology of amphetamine base and of the widely used amphetamine sulphate taken by mouth has not been fully worked out, there seems no doubt that the subjective effects of equal dosage are about the same. The three outstanding effects reported by inmates were: (*a*) it makes the time go faster, (*b*) it makes me feel happy, and (*c*) it makes me talkative. Monroe and Drell discuss the psychiatric implications of the habit. Four patients developed an overt psychosis, and one prisoner who took the entire contents of a tube (250 mg.) developed a violent headache an hour later, followed by recurrent sensations of numbness and paranoid symptoms which lasted a week.

Of the 264 prison inmates who admitted using the drug, 14% said they took amphetamine before entering the army. On the other hand, 27% had received amphetamine tablets from "medical or other officers," and 65% had started within the previous ten months. Benzedrine has had much publicity in the American press and in comic songs—"Who Put the Benzedrine in Mrs. Murphy's Ovaltine?" is said to be a popular one. Monroe and Drell suggest that a small nucleus of civilian users have taught others to seek escape from the frustrations of the army and of confinement in this way. As with all forms of addiction, this habit seems to be mainly acquired by people with personality defects.

TREATMENT OF URÆMIA

IN opening a discussion on the modern methods of treating uræmia, at the Royal Society of Medicine, urological section, on Jan. 22, Mr. Ronald Reid reported that since he first used transperitoneal dialysis in 1946 he has treated 6 cases in this way, with 3 survivals. He favours intermittent rather than continuous irrigation, because the former allows slightly better control of absorption. Even so, however, in 5 of the 6 cases more fluid was injected into the peritoneum than could be withdrawn from it. In his experience 5% glucose-saline has given better results than saline alone. The amounts of urea removed in the washings have ranged from 4 g. to 38 g. A curious feature is that the concentrations of both urea and chloride in the peritoneal dialysate rise from low levels to considerably above those in the blood. In Mr. Reid's view this method, though still in its infancy, is potentially a valuable measure for the treatment of metabolic and other intoxications.

Turning to the artificial kidney, Dr. E. W. Darmady demonstrated his own version of the Kolff kidney, the first machine suitable for clinical use. His attempts to devise a dialyser which would be less bulky and formidable and better able to function at the bedside without frightening the patient have not yet been successful, nor has he yet produced a machine which will give an adequate urea turnover along the lines of Alwall's kidney.[9] Dr. Darmady's own machine differs from the Kolff kidney chiefly in the smaller volume of bath fluid (20 litres), which leads to a more rapid equilibration, and in the two synchronised pumps governing arterial inflow and venous return. This ensures the maintenance of circulatory volume, and control of the blood-flow also leads to a more even blood film over the dialysing surface. A difficult point, on which work is being done, is the optimal osmotic pressure of the bath fluid; in Dr.

1. Annotation, *Lancet*, 1947, ii, 476.
2. Braithwaite, R. F. *Brit. med. J.* Jan. 3, p. 14.
3. Harrison, F. F., Mackay, R. P., Gottstein, W. K. *J. Amer. med. Ass.* 1946, 132, 12.
4. Davis, J. P., Lennox, W. G. *J. Pediat.* 1947, 31, 24.
5. Monroe, R. R., Drell, H. J. *J. Amer. med. Ass.* 1947, 135, 909.
6. *Bull. U.S. Army med. Dep.* 1946, 6, 204.
7. Simpson, N. A., Simon, E. *Amer. J. Pharm.* 1937, 109, 343.
8. Waud, S. P. *J. Amer. med. Ass.* 1938, 110, 207.
9. Alwall, N., Norvilit, L., Steins, A. M. *Lancet*, Jan. 10, p. 60.

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Darmady's view a non-dialysable substance would be preferable to glucose. Some early results indicated that the total osmotic pressure of the blood in uræmia is much greater than normal.

Dr. E. G. L. Bywaters reported that since October, 1946, the kidney unit at the Postgraduate Medical School of London, including Dr. A. M. Joekes and Dr. Graham Bull, have dialysed 15 patients with 2 complete recoveries, one of the successful cases being a post-traumatic anuria and the other a uræmia following cholecystectomy in which 'Myanesin' was used. In the remainder, many of which were hopeless cases of terminal glomerulonephritis, only temporary improvement has been obtained, as would be expected, though the blood-urea has been halved and 20–72 g. of urea removed at a blood-flow of about 80 ml./min. There has been one death after dialysis from subdural hæmorrhage, but otherwise heparinisation has not given rise to any trouble. One case of aspirin poisoning has been treated. Dr. Bywaters described various adjuvant methods and technical modifications, such as the introduction of cardiac catheters to ensure backflow, and emphasised the value of a high-calorie low-protein diet as advocated by Borst. He hoped that subsequent discussion and experiences will define more clearly the spheres of usefulness of diet, peritoneal dialysis, and blood dialysis.

THE CHILDREN BILL

THE Curtis Committee on the care of children deprived of a normal home life, and Lady Allen of Hurtwood, whose letter to the *Times* of July 15, 1944, first moved the Home Secretary to appoint that committee, have now the satisfaction of seeing their proposals and hopes embodied in a bill. The text, published on Jan. 17, shares the Curtis Committee's imaginative concern for the welfare of individual children. The child who is lost, abandoned, or neglected by his parents, the child unable to share ordinary family life because of mental or physical disability, the delinquent child sentenced by the juvenile court to be separated from his family, now become the official responsibility of the public authorities, who, through children's committees, are to exercise the care of a parent towards them as long as they are under 18 and seem to need it. A parent or guardian has a right to object to this assumption of parental responsibility by the local authority; and in that case the authority's responsibility will lapse unless a court orders that it should remain in force. The duty of assuming parental responsibility will fall on the county councils and county-borough councils; and to ensure that it is carried out in an intimate and human way, the councils are to appoint children's officers whose task, as the *Times* of Jan. 17 puts it, will be to transform public benevolence into personal understanding and solicitude. The women appointed to this office must know each child personally; or, if the area is a large one, must make sure that each child is known personally to some member of their staff. The child must feel that the children's officer is his friend, with a real and warm concern for his well-being. The ability to achieve this relationship with children is not given to all; and it is to be hoped that in choosing children's officers the local authorities will put this ability before even such important qualities as administrative capacity, experience, and age. The woman of fifty who can give the child confidence is worth more than the efficient youngster who lacks that particular gift.

Local authorities will also have the duty of providing homes and hostels for children who need them, though it is made clear that the child's proper place is in his parents' home, or failing that in a good foster-home. There will always be some children, however, for whom a foster-home cannot be found, either because suitable foster-parents are scarce in their district or because the children themselves do not fit into the ordinary family pattern. The younger children will be brought up in local-authority or voluntary homes; and 60 young women are already taking university courses in child care to prepare them as supervisors of such homes, while 100 women have been chosen for training as house mothers. The Home Office will supervise the conduct of voluntary homes, and in addition any person authorised by the local authority may visit children in voluntary homes. Children over school age will live in hostels from which they will go out to work; and these hostels will also take some other young people of the same age, so that the children under local-authority guardianship will not find themselves segregated from others living normally in the community.

FATAL HYPOGLYCÆMIA

HYPOGLYCÆMIC reactions were not unknown in pre-insulin days,[1] but since the introduction of insulin they have become a major problem in the treatment of diabetes. Fortunately, in most cases they are no more than a nuisance, and for that reason there is a tendency to belittle their importance. This tendency is accentuated by the inexplicable reluctance of the average practitioner to take an interest in his diabetic patients. Almost always the diabetic is referred to a special clinic; and too commonly the family doctor, shelving his responsibility, assumes that the clinic will provide all the supervision the patient needs. Though much may be said for using specialist advice and resources, the doctor is liable to be at a loss in one of the sudden emergencies of diabetes where the prognosis largely hangs on accurate diagnosis and immediate treatment. For example, hypoglycæmia, despite the textbook's clear descriptions, is often allowed to advance to a stage where it threatens, or even ends, the patient's life; yet, except in association with severe coronary disease, hypoglycæmia is seldom rapidly fatal. As a rule, the deaths are due either to the condition being missed and therefore not treated, or to hyperglycæmic coma being diagnosed and the patient given increasingly large doses of insulin. This is well brought out by reports from Joslin's clinic,[1] where of 7 fatal cases recorded in detail, 3 received large doses of insulin. In a case reported by Brull[2] a middle-aged diabetic had unrecognised hypoglycæmic reactions which were treated with 200 units of soluble insulin; not unnaturally hypoglycæmic coma rapidly set in, and the patient died in spite of active treatment in hospital.

The widespread adoption of protamine zinc insulin (P.Z.I.) has complicated the problem. With this preparation hypoglycæmia is less likely to develop but more likely to be overlooked in its early stages because of its slower and more insidious onset. The patient receiving P.Z.I. may become comatose without any warning. This is particularly apt to happen when the P.Z.I. is injected in the morning, for the chances of dangerous hypoglycæmia will then be highest in the subsequent evening or night, and the prodromal symptoms may not be sufficient to waken a sleeping patient. Many clinicians therefore prefer to give P.Z.I. in the evening. The other risk of P.Z.I. is illustrated in the case reported by Dr. Winkler in this issue. If hypoglycæmia is misdiagnosed as hyperglycæmia and accordingly treated with P.Z.I., the prolonged and delayed action of the insulin neutralises the effect of glucose given when the correct diagnosis is made. With soluble insulin the coma can usually be overcome with suitable amounts of glucose, given intravenously if necessary; but with P.Z.I. the glucose has to be given over a long period, and even then it is difficult to obtain the desired effect. If only soluble insulin were used in the treatment of hyperglycæmic coma (or threatened coma), as is always

1. Marble, A., White, P., in Treatment of Diabetes Mellitus, by E. P. Joslin et al. London, 1946; p. 387.
2. Brull, L. *Rev. méd., Liége*, 1947, 2, 609.

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recommended, this particular risk would not arise. The grave features of continued hypoglycæmic coma are intercurrent infections (now usually controllable by penicillin) and irreversible changes in the central nervous system. Experimentally it has been shown that these changes, involving the cortex, midbrain, and medulla oblongata, are reversible only if the hypoglycæmia is short-lived.

The risk of misdiagnosis would be reduced were every diabetic to adopt the habit, almost universal in the U.S.A. and gradually extending in this country, of carrying about with him a small card indicating that he has diabetes and stating his current dosage of insulin.

UTERINE INERTIA IN THE FIRST STAGE OF LABOUR

THE general opinion expressed by the obstetricians of the Royal Society of Medicine on Jan. 16 was that a woman who has been in labour over 24–30 hours should be classed as a case of primary inertia and that primary inertia can be divided clinically into three different types. First, there is the woman who starts with poor contractions and never has a really powerful pain; this is the worst type. In the second group is the woman whose uterine contractions might be efficient but are inhibited by corticothalamic impulses produced by fear. The third type of case is that of the woman who has powerful or almost tetanic contractions but whose cervix refuses to dilate—the condition which was called lack of polarity. Mr. D. M. Stern, Prof. H. J. Drew Smythe, and Mr. J. V. O'Sullivan, the opening speakers, showed that the incidence of primary uterine inertia in big series of deliveries in many different hospitals is strikingly uniform at something under 10%. They showed also that it is essentially seen in primigravidæ, though multigravidæ are not immune; it is not restricted to elderly women. The treatment advocated was on the whole conservative, and when Dr. Grantly Dick Read made his well-known plea for a psychosomatic approach it was clear that most speakers agreed with his principles, though they did not go quite so far as he would wish. Special attention should be paid to allaying the patient's fears by simple applied psychology and the use of sedative drugs, pentobarbital and morphine being specially mentioned. Attention was also drawn to the importance of combating dehydration and any tendency to ketosis by the administration of glucose and a careful watch on the urine. As long as the membranes remain intact labour can safely be left indefinitely, and the main indication for terminating labour is fœtal or maternal distress. There was some doubt as to the efficacy of pituitary extract, and œstrogens have proved disappointing.

Prof. W. C. W. Nixon demonstrated the tocograph, which registers uterine contractions on graph paper, and the tocometer, which records uterine pressure on a manometer, both presented to him by Prof. Sandor Lorand. Some graphs, made in collaboration with Lorand, showed that there are three types of inertia—hypotonic, normotonic, and hypertonic—the hypotonic corresponding with the first clinical type already mentioned. Professor Nixon's graphs illustrated how 2 units of 'Pitocin' can initiate a ten-minute uterine tetany. There is no doubt that the tocometer opens up a new method of scientific approach by which uterine contraction can be measured quantitatively and qualitatively and a reasonable prognosis can be made relatively early in labour. He also drew attention to the possibilities of the extraperitoneal cæsarean section, an operation which is becoming increasingly popular in the United States for the late case but which conservative British opinion has been slow to test and unwilling to adopt. Professor Nixon seemed inclined to widen the use of cæsarean section in the treatment of inertia, a point which was subsequently stressed by Mr. John Howkins. Mr. Aleck Bourne condemned the use of cæsarean section for any case of inertia in which the head was well down in the pelvis, and emphasised the ease with which the cervix can be manually dilated. Mr. Howkins drew attention to the innervation of the uterus. The pain centres for the uterus in the cord are situated somewhere between DXI and DXII, and can be blocked by a local or caudal anæsthetic going to this level and not higher; if the caudal is taken higher than DVI the centres in the cord which subserve uterine contraction are inhibited and a strong labour can be converted into a case of primary inertia. He suggested that a better understanding of the nerve control of uterine contractions in labour might enable one to inhibit spasm, rigidity, and lack of polarity in the cervix without upsetting the power of the detrusor muscle of the uterus.

CHARTS AND NURSES

IT is perhaps the fault of doctors if routine and tradition have come to mean more in nursing training than experiment and research. But obedience to the doctor's plan of treatment should not prevent the nurse from bringing her own ideas into play when carrying it out. Mr. Hamilton Bailey [1] recently appealed to nurses over a topic which has surely long been appropriate for nursing research. Charting of temperatures was started in Germany by Carl Wunderlich in 1864; and the chart still in use in most of our hospitals was designed by W. Rigden in 1872. It shows the temperature as a graph, but pulse and respiration rates are clamped into tiny triangles at the foot of the chart, and cannot be distinguished except by peering at the figures. Mr. Bailey recommends a type of chart in use in some hospitals, which shows graphically not only the temperature but the pulse and respiration. Charting takes no longer by this method, and the general condition of the patient can be assessed from one quick glance. He urges nurses to press for the adoption of this type of chart, since he has appealed to the doctors in vain. He also pleads for the use of the fluid-balance chart. As he says, intravenous drips are nowadays given so freely that patients are often in danger of getting too much fluid, unless a careful record is kept of intake and output. (Indeed, he suggests that deaths from drowning from this cause probably far exceed those occurring round our coasts from the perils of the sea.) He therefore advocates the use of the fluid-balance chart recently devised by the Australian surgeon, Charles Gale.[2] The record is made in figures, placed under headings, and the balance is cast up twice daily.

Mr. Bailey's article has awakened the interest of several nurses and ward sisters, one of whom, Miss E. M. Hardy,[3] proposes a different type of chart showing intake and output graphically in blocked-in columns. This is an improvement on the Gale chart, since the balance is immediately apparent at any time of the day or night. Miss Hardy keeps a rough chart on the ward desk, and any nurse giving the patient a drink or measuring urine goes at once and inks in the appropriate number of squares. A neat copy, kept with the patient's notes, is brought up to date every morning. An ordinary four-hourly temperature-chart sheet serves well enough for the Hardy chart, which is another point in its favour.

THE results of the British Medical Association plebiscite on the National Health Service will be discussed at a special meeting of the council on Feb. 18. A special representative meeting of the association, to decide on policy, will be held on March 17. Voting forms have been sent to 56,000 doctors.

1. *Nursing Mirror*, Jan. 17, p. 274.
2. *Aust. N.Z. J. Surg.* 1946, **16**, 44.
3. *Nursing Mirror*, Jan. 31, p. 316.

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Special Articles

FOOD IN HOSPITALS

THE general standard of dietetic service in hospitals came in for harsh criticism when the Royal Society of Medicine's section of medicine met on Jan. 26 to discuss the service of the future.

Lord WOOLTON said that as Minister of Food he had found that some people thought of food as a means of assuaging the pangs of hunger, while others ate for pleasure; few selected meals for their food value. In hospitals he had been appalled by the way food was cooked and prepared for nurses, and a start might be made by improving this aspect of hospital catering. If every convalescent received elementary lessons in food values, this would exert a tremendous influence on the nation's health. It should be possible for people to obtain advice on food in all medical institutions and at infant-welfare clinics, where advice should be extended to the feeding of mothers.

Sir JACK DRUMMOND, F.R.S., attributed many of the defects to the evolution of the hospital from the charitable institution of the eighteenth century. Then feeding had been a secondary function, and one cooked meal a day was considered sufficient: there was close integration between nursing duties and the provision of food; and there was parsimony in the kitchen. All three tendencies survived to this day. A committee of King Edward's Hospital Fund published in 1943 a memorandum recommending: (1) separation of catering from nursing; (2) employment of dietitians for all patients and nursing staff; and (3) complete review of the catering organisation. Investigation had revealed shocking conditions in some hospitals, where diets might yield as little as 1100 calories a day, or contain no more than 40 g. of protein. In 1945 a second report urged the separation of catering (as distinct from feeding) from all other activities, and it pointed out that the science of nutrition had advanced so far that no nurse could be expected to become a capable dietitian during her primary training. Some hospitals, Sir Jack Drummond said, still keep no records of purchases and issues; responsibility for records and other catering duties should be unified. Time after time it was found that the food was monotonous, with menus identical week after week, and the service unattractive, with food badly cooked or half cold. Even now the full rations were sometimes not taken up; an overworked housekeeper had no time for sheaves of Ministry regulations.

Four aspects must, he suggested, be taken into account: (1) catering was a highly skilled and specialised task; (2) the planning of meals was the job of competent dietitians; (3) the planning of kitchens, about which much could be learned from the United States and Scandinavia, influenced the efficiency of the service; and (4) meeting the patient's likes and needs was the nurse's job. The aim should be to reach the standard of a good hotel; and for all hospitals to achieve this the smaller ones should group themselves and share the services of a catering officer and a dietitian. "How many come out of hospital impressed with the quality of the food they have received and aware of the influence of food on health?" Often food was given simply to keep the patient alive during his treatment.

Dr. H. L. MARRIOTT pointed to the importance of food for the patient's physical and psychological welfare. He estimated that in perhaps 30% of hospital patients dieting was the principal form of treatment. The aim should be to supply abundant food of the first quality, well cooked and attractively served, with wide variety and choice, nutritionally adequate, and appropriate to the patient's needs and disorder. Although the standard was improving, hospital feeding did not yet fulfil these criteria. First of all, teachers of medicine must convince hospital administrators and managements. There must also be suitable administrative machinery. Each hospital should have a food committee consisting of an influential and forceful chairman, members of the board and of the medical staff, the superintendent. the caterer, the dietitian, and the matron. Members should appoint food inspectors to pay surprise visits to the wards and kitchens. At the Middlesex Hospital such a committee had operated, successfully, for over two years. Responsibility must be fixed on the catering officer who should be subordinate only to the superintendent.

Captain H. BRIERLEY, as a hospital administrator, agreed that catering must be the responsibility of a single expert. Menus should be published in advance and should provide a choice so that the sister could feed every patient properly. Some favoured the cooking of all food in one large kitchen, while others recommended a separate kitchen for each ward or floor. He himself thought that there should be one kitchen for patients, one for staff, and possibly one for private patients; and there should be a central pastry and sweet kitchen and a central salad kitchen. The diet kitchen should be an annexe to the main kitchen. Arrangement of diets called for common sense; it was wrong for a cheerful diabetic to sit up eating chicken while the patient dying of cancer in the next bed received, on an ordinary diet, unappetising stew. Every hospital should serve four attractive meals each day; and only tea should be prepared in the wards. Ward service should be undertaken by the sister, who knew most about the patients and could aid the helpless.

This was endorsed by Miss MARGARET BROATCH, recently returned from the United States, where, she said, food service was completely divorced from nursing duties; in the wards food was served by ward-maids under the dietitian's supervision. It was now recognised in the United States that at this point the service broke down; nurses there did not recognise feeding as part of their nursing function. Miss Broatch appealed for the recognition of this danger by instruction of nurses in nutrition during their training. For the rest, hospitals must recognise that the appointment of a catering officer did not end their responsibility; to do his work properly, the catering officer must have active support.

RESOLUTIONS ON THE ACT

THE following resolutions have lately been passed at meetings of the bodies concerned:

Royal College of Physicians of London

That after the plebiscite and the special representative meeting of the British Medical Association (March 17), a special comitia should be held to determine what action could most usefully be taken in the interests of the public and the profession as a whole.

Royal Faculty of Physicians and Surgeons of Glasgow

The Royal Faculty views with apprehension the failure of the Minister of Health and the Negotiating Committee of the medical profession to reach agreement and urges Parliament to amend the National Health Service Act and the National Health Service (Scotland) Act. The Royal Faculty considers that if these Acts are implemented in their present form they will not operate in the best interests of the public and will seriously impair the ultimate quality of medical treatment in this country.

St. Bartholomew's Hospital Medical Council

The medical council is unanimously opposed to the National Health Service Act as at present constituted and will not enter into any contract with the regional or teaching hospitals boards under this or an amended Act without further discussion in this council. This resolution is made on the assumption that the whole-time officers will continue their work but that they will not enter into the field of general practice nor into new contracts as part-time consultants or specialists with the regional or hospital boards, even if continuing their work involves accepting new contracts with new employing bodies to which they may be automatically transferred. The whole-time officers will not take over the wards or duties of their part-time colleagues. The members of the staff will continue to care for their patients at St. Bartholomew's Hospital.

Guy's Hospital Staff

The visiting medical and dental staffs resolved that, while continuing to serve the patients of the hospital, they are not prepared to accept service under the National Health Service

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Act until it is clear that it commands the confidence of the majority of the medical practitioners of the country.

Royal Free Hospital Medical Committee

The medical committee is unanimously opposed to any participation in the National Health Service Act as it is at present framed.

Last Saturday the representative board of the British Dental Association recommended members of the B.D.A. not to enter the National Health Service until the Act and its regulations are amended, but expressed the association's willingness to continue its contact and discussions with the Minister in order to secure its amendment.

Medicine and the Law

Consummation

ECHOES of the decision of the House of Lords in Baxter *v.* Baxter still reverberate. Section 7 (1) (*a*) of the Matrimonial Causes Act, 1937, makes a marriage voidable on the ground that it has not been consummated owing to the wilful refusal of the respondent. The Baxter decision is that, where marital relations have taken place, the use of contraceptives—whether with or without the consent of both parties—does not prevent the marriage being "consummated" within the meaning of section 7. Such was the Attorney-General's exposition of it when asked in the House of Commons on Jan. 26 whether he proposed to introduce legislation to amend the Act in view of the decision. The case, he said, did not decide that one of the parties to a marriage was entitled to refuse marital relations unless contraceptives were used. Nor did it decide that, in such a case, where relations were so refused, the other party would be without remedy. It is possible that, in the circumstances of a particular marriage, the courts may have to decide the effect of the use of contraceptives against the wish of one of the parties. That problem is left to the courts.

The Government's refusal to patch the matter up by fresh legislation is not surprising. Questions of divorce, especially when they involve religious issues such as the Christian view of marriage or the interpretation of the marriage service in the Prayer Book, are not welcomed when the Cabinet draws up its programme of legislation for the session. They cut across the divisions of party politics and therefore are left to the enterprise of the private member. Sir Alan Herbert used his chance in that capacity to secure the enactment of the 1937 statute; but from that time to the present the private member has been deprived of his rights of initiating legislation. Each session, for some ten years now, the Government has persuaded the House of Commons to pass an order declaring that no Bills other than Government Bills be introduced. The Government will not bring in a Matrimonial Causes (Amendment) Bill, and no-one else can. We are left therefore with the Lord Chancellor's dictum in Baxter *v.* Baxter that Parliament, in using the word "consummate" in section 7, cannot have intended that the courts should be involved in inquiries about the use of contraceptives. Parliament, he said, used the word "consummate" as it was understood in common parlance and in the light of social conditions known to exist.

"... Let us concede, as we must, that wise sentences are most difficult.... For one thing, the present duty of sentencing places an unfair burden upon a single Judge. For another, it exposes the offender to individual idiosyncrasy; the sentence may depend on an illegitimate physical factor such as judicial indigestion, or an illegitimate mental factor such as judicial prejudice. For yet another, the single-Judge sentence is undemocratic in democratic days. Finally, the present sole unassisted sentence-giver is merely a lawyer, when the question is partly one for doctors, psychologists, psychiatrists, and even perhaps for policemen. . . . Sentences should be imposed by a Committee and never by an individual; not immediately and rapidly as at present, but after consultation and consideration. That sentencing Committee should consist of at least four persons: the Judge or magistrate, a doctor, a psychologist or psychiatrist, and a prison representative who would be a penological expert."—C. G. L. DU CANN, *Med.-leg. J., Camb.* 1947, **15**, 147.

In England Now

A Running Commentary by Peripatetic Correspondents

THERE are attractions about life in the Arctic Circle, besides the absence of rheumatic fever, nephritis, and atheroma, which Dr. Duncan mentioned the other week, if I can believe a beautifully illustrated book about Greenland, which has come to me from friends in Denmark. The captions below the pictures are in Danish and English (of sorts). In the first place, Greenlanders can have houses, lucky creatures. In the north, at Thule, snow is plentiful and unrationed, and building is done with modern tools; but elsewhere this is out of fashion and farther south turf huts, looking indistinguishable from very solid Anderson shelters built with large stones and turf, "do have the quality of being snug in winter." However, turf huts are also going out of fashion, and "building of wooden houses makes great progress all over the country" and some Greenlanders even "have the audacity to start building quite a little villa." It is quaint to think of Eskimos in villas. There is food and clothing enough, for sheep-farming flourishes and supplies the whole colony with mutton and wool. The women's dress is picturesque, with richly embroidered tunics, sealskin trousers, and high, white, embroidered boots. There is an abundance of fish and shrimps, much of which is canned and exported to Denmark. On some farms milk, home-made butter, and woollen products are "facts of everyday life." But milk is not generally an important item of diet for there are very few cows in Greenland: "they eat too much of the scanty fodder as compared with their usefulness, but it is a remarkable thing to see the sons of hunters and trappers live in gentle cohabitation with domestic animals."

Medical services seem to be well organised. Every settlement has a hospital providing free medical treatment for all Greenlanders. "It is a sad fact that a hospital bed is very seldom vacant." Tuberculosis is the plague of Greenland and a vigorous campaign is being waged against it. Under a picture of plump, smiling patients in an open-air ward one reads, "The sunshine is hardly as efficient as in southern latitudes, on the other hand, the patients enjoy the pure, invigorating mountain air." There are nurses and midwives educated in Greenland, but all the doctors are Danish. These doctors spend a large part of their time travelling by boat or dog sledge, and the unknown commentator remarks, "It is a sure thing that everybody declares to be fit and healthy when the doctor arrives. Only when he has one foot in the boat to leave again will ailments be disclosed."

* * *

To those striving after success I can offer an artful trick worth trying. For some time amazement has been caused among us junior boys at the incredible learning displayed by young Dr. B. Ouncer at our clinical meetings. Whenever the discussion wanes, he leaps to his feet with some crack like: "Yes, I agree that this case is a perfect example of Finkelbaum's syndrome. Though I seem to recall that his case differed in having red hair and a wooden leg." Murmurs of admiration seep through the hall, while some squirm with fury and even (yes!) envy. But I have discovered the ruse. By getting to see the cases nice and early he has time to nip up the stairs to the library and search the tomes for some piece of extravagant erudition. Then he comes down in time for the discussion and trots the information out, as it were from the depths of his incredible memory. It's clever—and it fools the seniors. Or does it?

* * *

When I was a boy the equipment of a diviner was a witch-hazel rod which behaved in a most unaccountable manner when he struck water. Modern diviners, as I learned at a meeting of them the other night, are more enterprising. The old wooden rod has been largely replaced by a rod of metal; and even this, it seems, now takes second place to various forms of pendula. Living and inanimate objects, we were told, are surrounded by forces which account for the swing of the pendulum; and we saw a film in which the pendulum weaved in different patterns when brought

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under the spell of various pieces of bric-à-brac. Carried round the periphery of a circle drawn on paper, the pendulum came to life at regular intervals; and when the points on the circle below each scene of motility were joined to the centre, the circle was found to be divided into ten equal parts. The exponents of divining do not deny that psychic factors may play some part; but they are diligently seeking a physical cause. Observation of peripheral vascular changes in the diviner at work drew attention to the cardiovascular system. The E.C.G. was invoked, without effect. Then the blood-pressure was found to rise slightly during the act of divining; and now the hunt is coursing through the para-sympathetic system to which entry was gained via the carotid sinus.

The best news of the evening was that we all can be diviners; we all have it in us, but our sensitivity varies. Those with a low threshold can be brought up to scratch by an electrical device creating an electromagnetic field. The trouble is that this E.M.F. has got to be just right; and even then the shape of the pendulum's swing varies not only with the "emitter" but with the receiver.

* * *

Streptomycin is theoretically obtainable in this Far Eastern colony through normal trade channels at a government-controlled price. None, of course, is to be had. A G.P. told me today how to get it. You just go down to the docks and contact the chief steward of an American ship. All chief stewards of American ships have plenty, and are very pleased to sell at about twice the controlled figure (37*s.* 6*d.* a gramme).

* * *

An unusual experience befell us the other evening. We met a friend who said: "Come, and I will give you a good dinner." Neither my missus nor I can resist that sort of invitation, so we went. The taxi drew up outside a tightly curtained building to which we were at first refused admission; all the tables, it seemed, had been booked. When our host persuaded the man on guard that he had been eating there only three days before, we were admitted, without further ado, to an almost empty restaurant. The first thing that struck the eye was a half-pound or so of butter on the table, and the rest of the meal (for which there was no menu) was on the same scale; we had five large courses, including a fine steak. The waiter was all tender commiseration: "You are very hungry?" he asked sadly, and his tone suggested that we had just found strength enough to win our way through a famished city to this small island of plenty. As the place filled up, newcomers stared at us, and we at them; each, I think, was wondering if his guilty secret was safe with the other. A good citizen would report these goings-on; but that would be poor return for my host's kind-hearted (and very costly) hospitality. As we left I reflected that the continued survival of this place is an unhappy token of our withered social conscience; in the war it would not have lived a week, but now we are tumbling into the catch-as-catch-can habit of some Continental countries. It would be good to add that with these uneasy thoughts the food choked me; but it would not be true.

* * *

The allegation that academic appointments go too often to men who can discover but cannot teach recalls a witticism at the expense of a famous physicist. His first assistant was a Mr. Day, and on returning to the provinces after receiving the accolade in London the chief found a large notice on the door of his lecture theatre: "Let us work while it is Day: the knight cometh, when no man can work."

* * *

Proud father shown into my consulting-room: "Doctor, I want to register the baby."

Self: "All right, go to the registrar's office."

P.F.: "But don't I need a certificate from you or will the nursing-home give me one?"

Self: "Certainly not. You just blow in and say to the registrar, 'I want to register a baby.'"

P.F. (after a pause): "As easy as that, and to think of all the trouble you have to get a drop of petrol."

Letters to the Editor

PSYCHOLOGICAL ASPECTS OF SANATORIUM MANAGEMENT

SIR,—As an ex-patient with no medical qualifications, I was extremely interested in the article (Jan. 10) by Dr. Todd and Dr. Wittkower. I was surprised to find no mention of patients' committees. Both in industry and in the Army, to achieve more self-discipline and to prevent friction, the emphasis is on coöperation rather than impersonal commanding. How can we relate this to the sanatorium? The following is a personal experience:

The approach of Christmas was being discussed. Normal practice had it that the ward staff took charge of such events. On this occasion we approached the sister with the proposal that we should elect a committee from the "up" patients to do the job. The committee was elected and immediately planned the Christmas programme; this was eight weeks before Christmas. Our first aim was to involve as many patients as possible in the preparations. Who could make decorations? Who could make gifts to be raffled? Everyone could ask their visitors for contributions for the treat; the committee arranged for a visit of a number of artistes from a variety theatre. The result—for two months everybody was eagerly anticipating the coming event, and working for it. All enjoyed the slap-up feed provided by the money raised, and enjoyed it the more because they all had a hand in it. *It was our own show; we weren't entirely dependent on others.*

There are difficulties in organising patients' committees: (1) the state of health of the patients; (2) most wards are split into small units, which prevents easy intercourse; and (3) the continual intake of new patients. Nevertheless, I feel that doctors and administrators should recognise that patients will always discuss how their temporary home is being run; and if this discussion is organised and the patients are given collective responsibility in such matters as food, entertainment, general discipline, and complaints, the results will benefit everyone concerned. Thus it is worth trying to overcome the difficulties; and every sanatorium has its quota of patients "on hours," who could help to solve some of the problems mentioned above.

Patients' committees can ensure that the grouse of the grouser never reaches committee stage; and the constructive criticism of a ward of average patients would be a substantial contribution to its smooth running.

Glasgow. JAMES HUNTER.

CENSORSHIP

SIR,—Though no question of security is involved, medical officers of the Colonial Service are still as closely bound by Colonial Regulations as are those of the fighting Services by King's Regulations. This causes great irritation, and is, I suggest, one reason why our contributions to literature are few, relative to the range and interest of our duties; a man does not like submitting his work to a director whom he probably detests.

The old *West African Medical Journal* died a few years before the war. In each Colony the director of medical services was the local editor. Had the local editors been specialists or pathologists, and had complete freedom of expression been permitted, it might still be alive and flourishing.

The necessity for constructive criticism by serving officers is indicated too clearly by the depleted and still dwindling numbers in the Colonial Medical Service.

WEST AFRICA.

SIR,—A recent example of censorship may be of interest to your readers.

I am a regular officer who retired in 1930, and last year it fell to my lot to deliver a presidential address. There is—unless it has since been amended as a result of my action—a regulation to the effect that "any information of a professional or technical nature which an officer may acquire in the performance of his duties or *in the course of his studies* will be regarded as the property of the Service and must not be published, or communicated either orally or in writing" to any person not directly

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employed by the Service without previous sanction. This applies equally to "an officer who has retired or who has otherwise ceased to be an officer on the Active List."

Clearly it would be a breach of this regulation to communicate the information that castor oil will open the bowels, since the knowledge was acquired "in the course of my studies." I accordingly wrote and asked whether permission would be necessary for me to deliver a presidential address on a purely medical subject. I was informed that I must submit a copy of the intended address in duplicate for approval. As it seemed to me ridiculous to require an officer who has been retired for seventeen years to obtain approval for an address on a purely medical subject, I decided to have a question asked in the House. In the meantime there was further lengthy correspondence which clearly emanated from utterly inexperienced individuals; and I was further required to furnish copies of my address to another department, which, from my inside knowledge, I knew to be not only ridiculous but unnecessary.

On a previous occasion when I wished to publish the result of two years' research work on a certain physiological subject I was told that I must not do so (notwithstanding the fact that it had been done since my retirement and at my own expense) without submitting my article in duplicate for official sanction. I thought this unreasonable, refused to do it, and destroyed the article and the whole of my notes.

After notice had been given of the question to be asked in the House, I received, to my surprise, a letter no longer bearing a reference number resembling a mathematical problem, and addressing me personally, from a very senior officer, telling me in a most friendly fashion that of course I could deliver my presidential address, and that no official sanction was necessary. The matter, however, was already out of my hands.

In the meantime the question was duly asked in the House, and the reply made it appear that somebody had erred and that I should not have been required to obtain sanction at all. Reading between the lines, I gathered that somebody had had his knuckles rapped. Whether as a result of this the regulation has been modified I do not know. ESSE QUAM VIDERI.

*** A parliamentary answer to a question on censorship in the National Health Service appears on p. 233.—ED. L.

TREATMENT OF LEPROSY

SIR,—The summary you gave last week of the discussion on leprosy at the Royal Society of Tropical Medicine and Hygiene reports me as having said (of leprosy in England): "It is only within the last ninety years that pictures of lazar houses, lepers' windows in churches, and so forth have appeared in print."

I did not mention pictures of lazar houses. As regards hagioscopes, I said that there is no contemporary evidence that these so-called leper windows, or squints, had anything to do with lepers; that this belief is of late origin, and was suggested or at least supported by the misinterpretation of an old picture; and that the earliest mention of the term "leper window" which I have so far seen in print dates back only about 90 years.

I spoke fast as there was a strict time limit, and no doubt it was difficult for a reporter to keep up with my argument.

London, W.4. W. P. MACARTHUR.

PRESENT STATUS OF DISC SURGERY

SIR,—In your leading article on Nov. 1 you give Love's indications for fusion and follow this immediately by saying that "the standard orthopædic procedure requires three months in a plaster bed and protracted support and reablement thereafter." Lest it be misconstrued that this is the standard treatment followed out by Love and other neurosurgeons who do "combined operations" along with members of the section of orthopædic surgery at the Mayo Clinic, we hasten to point out that the period of hospitalisation here is seldom longer than three weeks.

In the "combined operation," after the neurosurgeon has removed the disc the orthopædic surgeon, using single or twin tibial grafts, fuses the last two lumbar vertebræ to the first two sacral vertebræ. Thereafter, the patient is kept flat in bed, without splintage, for 19 to 21 days. He is then allowed up and fitted with a canvas supporting belt with steel stay supports; this he wears for six months. At the end of this period the fusion is considered to be wholly sound and no further restrictions are imposed.

J. M. JANES
Mayo Clinic, Rochester, Minn. A. M. MCKELVIE.

PLANTAR WARTS

SIR,—Most dermatologists will welcome Mr. McLaughlin's remarks, in his article last week, on the radiotherapy of plantar warts. I have for some years treated these warts with a technique such as he describes, but without cauterisation or diathermy. By such curettage the main mass of the wart is removed, leaving the tops of the papillæ exposed and many interpapillary epithelial processes intact. It is because the interpapillary processes remain that healing takes place in 7–10 days without scarring.

Since Mr. McLaughlin, with his method, obtains healing without scarring in a similar period, it is evident that his cauterisation or diathermy is extremely superficial and also leaves intact the interpapillary processes. It may legitimately be questioned what contribution such light cauterisation can make to the result, and whether it prevents recurrence as surely as he believes. Recurrences, when they occur, are often delayed for three or four months, after a period of apparent cure. A hasty judgment of results may therefore be completely misleading. It is a pity that while obtaining success "in all cases" Mr. McLaughlin does not give his own figures of cure-rate, nor say when, even in the case reported, the "final" result was assessed.

I believe this method of treatment to be as good as any; I know that I do not obtain 100% cures and need some assurance that Mr. McLaughlin's results have not been prematurely and too optimistically assessed.

London, W.1. F. RAY BETTLEY.

HEALTH EXAMINATIONS

SIR,—The definition and measurement of health is still very largely the province of the research-worker. Doctors know very little about health, and this ignorance will continue so long as medical education is based not upon methods for relating health to environment but upon methods for detecting disease. The physical examination of a patient is primarily a method for detecting disease, and its technique was developed in an era when the physician's skill was measured by the accuracy with which he forecast the post-mortem findings.

The promotion of health, on the other hand, whether in university or factory, is a function of administration—both technical and domestic—and it is the doctor's job to advise in this sense. The last place he should be is in his sick-bay. How can a "health" examination prevent rheumatic fever or coalminer's nystagmus? In the first, the answer is to be found through social administration, and in the second, as in most industrial diseases, through applied engineering or technical administration. Let us, therefore, keep clear in our minds the difference between the detection of a disease and the promotion of health, even though they may be complementary parts of the same whole.

Medical School, Newcastle-on-Tyne. R. C. BROWNE.

SIR,—In peace-time a large proportion of the non-hospital medical officer's daily work consists in carrying out release examinations. These involve the examination, with any degree of thoroughness one likes, of considerable numbers of healthy men.

A lot of useful information can be gained from carrying out these examinations accurately, and I feel that if the R.A.M.C. were to devote part of its preliminary training course at Crookham to some lectures and demonstrations of the normal "abnormalities"—e.g., third heart sounds, reduplications, minor deformities, and normal psychosomatic relations that are to be readily observed—M.O.'s more or less fresh from five years' study of diseases might benefit considerably. Lately, I have concentrated on listening carefully to normal beats in both the sitting and prone positions, and have been quite intrigued at the variety of noises and

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effects that are to be heard. A friend has also amused himself profitably by attempting to relate various body measurements to observe mental characteristics in men of his unit.

I feel the R.A.M.C. would be doing a useful job if it initiated some preliminary training in this work at the beginning of a M.O.'s Service career.

CAPTAIN R.A.M.C.

MANIFESTATIONS OF POLIOMYELITIS

SIR,—Between the end of June and October, 1947, the Borough Hospital, Croydon, received 40 cases of acute poliomyelitis, and 32 further cases in which the diagnosis was not confirmed. Among the 40 proved cases, of which 18 were in males and 22 in females, the age ranged from one to thirty-three years. The disease was usually severe; there were 4 deaths and only 3 abortive cases.

The usual symptoms of onset were severe frontal headache, fever, vomiting, pain in the limbs, stiffness of the neck, and weakness of the back. Within a short time these were followed by weakness of one or more limbs and then paralysis. In 19 cases paralysis affected the legs, while in 15 there was also paralysis of the back; in 6 there was paralysis of both arms and legs, and in 4 of one arm only. In 5 cases retention of urine was present and lasted for some days. The reflexes were variable, but in only 3 cases were they completely absent at a very early stage.

The 4 fatal cases showed early signs of respiratory failure, with pronounced cyanosis, difficulty in breathing, and rapid respiration; and there was definite intercostal or diaphragmatic paralysis. These patients were nursed in a Both respirator, but 2 died within forty-eight hours. One patient, a girl of nine, who was put in a Both respirator soon after admission owing to intercostal paralysis, still had to be nursed in it sixteen weeks after admission; she became distressed if taken out of the respirator for more than half an hour, although the intercostal paralysis had cleared up.

I wish to thank Dr. Oscar Holden, medical officer of health for Croydon, for permission to publish these notes.

Old Coulsdon. J. TODESCO.

HÆMOLYTIC DISEASE OF THE NEWBORN

SIR,—Most obstetricians wait several minutes before tying the cord, in the hope that the infant might acquire some more blood from the placenta. Their hope is seldom fulfilled since the placental circulation stops automatically as soon as the baby has taken one or two deep breaths. On very rare occasions this automatic mechanism does not work and the baby actually gets blood which is already deteriorating, since, as Dr. Morris Leff has conclusively demonstrated, "the placenta separates by itself as soon as the baby is born." How quickly the umbilical blood decomposes after separation of the placenta can be measured by the indirect van den Bergh method. It will be found that the bilirubin values rise from below 2 mg. to over 5 mg. per 100 ml. within the first quarter of an hour. The more deteriorated blood the infant thus acquires the greater is the likelihood of hæmolytic disease.

The attempt to get decaying blood into an infant's system might be called monkey business, but the rhesus monkey is definitely not at fault: she severs the umbilical cord immediately after birth. My compliments to her!

New York. ALFRED ROSSKAMM ROSS.

MISTAKES WITH INJECTION SOLUTIONS

SIR,—An inquest was held lately on a patient with varicose veins who had died from an injection of adrenaline, which was mistaken for a colourless sclerosing fluid.[1] A year or so ago there was an inquest on a patient who had died from intravenous administration of methylated spirit which was thought to be concentrated saline.

Early in the late war I injected methylated spirit instead of 'Novocaine' as the local anæsthetic for an intravenous infusion; the result was a slough 2 in. in diameter. On another occasion I inserted in error, but without ill effect, distilled water intrathecally instead of 'Nupercaine'; the label had become detached during boiling. The ampoules of distilled water used for mixing thiopentone were found to be almost identical with those containing nupercaine. Other errors occur in medical and hospital practice; and reports of them occasionally reach the newspapers from the High Court or from inquests.

I think it is possible to avoid these incidents by vigilance, clear labelling, and distinctive tinting of the fluids which are in common use—for example, chloroform in some hospitals is tinted red. The local anæsthetics I use are coloured blue, as is also saturated sodium chloride, though with a different shade. Carbolic-acid injections are tinted pink. May I suggest that the time has come when the pharmaceutical authorities might give us a standard range of colourings for commonly used injection agents such as morphine and atropine, thiopentone, procaine, saline, amethocaine, and ethanolamine. Etching instead of labelling the contents of an ampoule would be a further aid to accuracy.

London, W.1. HAROLD DODD.

1. See *Lancet*, 1947, ii, 959.

REGIONAL MEDICAL ASSOCIATION

SIR,—We read with pleasure in your issue of Jan. 3 the announcement of the formation of the Liverpool Regional Hospitals Medical Association, the objects of which were stated to be: (1) the establishment and maintenance of high standards of efficiency in the hospitals of the region; (2) the promotion of the professional interests of the members.

Over a year ago the Association of Medical Officers (Essex), representative of all branches of the profession employed wholly or part-time by the Essex County Council, was formed with similar prime objects. Its committee feels that the time has come when the association should be merged in the formation of a body covering the whole of the North-East metropolitan region. It is in the best interests of the doctors concerned and of the public that there should be close liaison between those who may be employed by the regional board and their professional colleagues in the service of local authorities in the region; and both should be eligible for membership of a regional medical association.

We should welcome the coöperation of interested professional groups or individuals in the region, and invite them to communicate with our honorary secretary at Delafords, Theydon Bois Road, Epping, Essex.

W. L. YELL, Chairman.
F. N. FOSTER, Vice-Chairman.
L. S. FRY, Hon. Secretary.
D. H. IRWIN, Hon. Treasurer.
L. COSIN
G. E. KEITH
E. MILES
R. C. COHEN
H. RAMSAY
N. S. R. LORRAINE
M. TURNER
D. MACLEAN
Executive Committee.

GOUT

SIR,—Professor Wood Jones's dissertation on gout is so admirable that many fellow sufferers must have derived great pleasure from its perusal. He, however, remains silent on the vexed subject of treatment, and, as one who has suffered sporadically but recurrently for many years, I would like to quote my own experience in case this delightful therapy may not have been noted by others sufferers.

I had my first attack when under canvas in the first world war; as I was only eighteen and living hard, there was no question of over-indulgence, either in food or alcohol, being a factor. The responsibility and worry of having been promoted to the rank of an acting-corporal-unpaid may possibly have been the trigger that set the process in motion, for I have found frequently in the past that attacks have coincided with, or immediately followed, a period of emotional stress or intellectual strain. Like most other sufferers I rang the changes on the vaunted medicaments and found no benefit from any.

It was not until some months ago, when I was practically immobile with the pain and shoeless from the swelling, that in desperation I thought of Galsworthy's *Old English* and decided that the condition could not

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become more unbearable and that I would invoke the anæsthetic effect of alcohol. So at luncheon I had half a bottle of Burgundy and a large glass of port. By tea-time the pain had completely gone, the swelling was disappearing, and by the next morning the whole condition had vanished.

I have since had cause to try this method on two occasions, each time with the same conspicuous success. In these days it is not a cheap treatment but its rapid effect makes it well worth a trial.

London, W.1. CHRISTOPHER HOWARD.

NEW ZEALAND HEALTH SERVICE

SIR,—In your issue of Jan. 24 Mr. Stocker makes a statement (which I should like to see confirmed) that "New Zealand dentists have willingly come into the fee-for-service adolescent scheme." My own most recent information from New Zealand, based on study of the New Zealand *Hansards*, is to the effect that the fee-for-service scheme, although liked by some doctors who prosper financially under it, proved to be such a ramp, resulting in very serious deterioration of the reputation of the profession and in the revolt of the public, that the scheme was officially withdrawn. The minister of health responsible for it from its inception was replaced by another minister, and the health arrangements generally are undergoing complete revision.

The almost unanimous revolt of the dental profession in this country against any suggestion of a State salaried service makes a contrast to the attitude which Mr. Stocker described as prevalent in New Zealand, and one would like to have further evidence on this point.

Mr. Stocker's warm advocacy of the transfer of large fields of dental practice from qualified dentists to lay workers is not, I submit, in any way supported by responsible dental associations in this country, nor indeed by bodies most representative of the profession in New Zealand. I have before me an article, prepared at the request of the New Zealand Dental Association for submission to a Parliamentary committee, written by the senior lecturer in prosthetic dentistry, University of Otago dental school, and published in the *Dental Magazine* (New Zealand) for December, 1947. While conceding that the actual manufacture of artificial dentures under instructions from a qualified dentist may be properly entrusted to dental technicians, he stresses that their design and fitting must be regarded as the province, "not of a skilled trade or craft, but of a branch of medical science, as it raises problems which are biological, not merely mechanical." Any direct approach by the public to the technicians for the supply of dentures uncontrolled by a qualified dentist trained in biology, anatomy, and physiology is to be deprecated, as much in the interest of patients as of dentists.

House of Commons. E. GRAHAM-LITTLE.

COXA VALGA ASSOCIATED WITH OSTEO-ARTHRITIS

SIR,—In your issue of Jan. 10 Dr. Hetherington raises several interesting points. The particular type of arthritis he describes, where the head of the femur is engulfed in the acetabulum, is found in the later decades but is rare. It was first described by Hermodsson,[1] who found the condition mainly in heavy manual labourers.

I have seen a few examples in women. Here loss of cartilage begins round the ligamentum teres. In Otto's disease (protusio acetabuli) when arthritis develops the femoral head is always very deeply enclosed. General loss of cartilage all round the head may give somewhat the same appearance, depending on the depth of the acetabulum; this is the type found as a complication of adolescent spondylitis. In young people also an exactly similar arthritis may develop, with no spondylitis; sometimes there is radiographic evidence of bilateral sacro-iliitis, so perhaps one may regard such cases as aborted spondylitis. Finally, this type appears where the hip-joint is involved in infective polyarthritis.

In all these Dr. Hetherington's description holds good: much loss of cartilage and few osteophytes. There is usually some decalcification and many cavities in the femoral head and acetabular rim. It seems probable that Dr. Hetherington's cases were of the Hermodsson type or, as a complication of Otto's disease, associated with a valgoid femur, but starting with sufficient synovitis to produce a very painful joint. I have no experience of lactic-acid injections in these; but the symptoms seem to be relieved by acid-phosphate injections, though it must be stressed that these alone will very rarely arrest the progress of the disease.

Dr. Hetherington suggests that the combination of an enclosed femoral head and a valgoid femur is more refractory to treatment. I should have thought that the valgoid femur has little to do with it beyond upsetting the balance rather more than would a varoid femur. At certain stages in the disease the limb would appear longer, as it often does in quite early osteo-arthritis where there is no loss of cartilage. In the contrary condition of a shallow acetabulum a valgoid femur is much more liable to subluxation, unless a heavy osteophytic buttress has been formed.

London, W.1. H. WARREN CROWE.

1. Hermodsson, I. *Acta radiol., Stockh.* 1944, **25**, 527.

TO THOSE UNDER FORTY-FIVE

SIR,—Mr. Layton takes upon himself the unenviable task of advocating the final and complete surrender of our professional independence. His appeal may be summarised in one phrase: "Distrust your colleagues and find security at all costs." This is a strange basis for the "altruism" which forms the last word of his letter.

The young doctors are not being asked to decide, as he puts it, "whether there is to be a career for them outside the service." The B.M.A. is simply asking them to refuse service for the time being, until the Government offer conditions which will safeguard the doctor's independence and the patient's interest.

Mr. Layton's brief paragraph on the Army and Navy is, in its way, a little masterpiece. In noting this comparison between the Army and medicine, it will occur to even his most hurried reader that there is perhaps some slight difference in function and method between these two honourable professions. Our future patients will be considerably disturbed if they hear of this parallelism between the Army and the future State medical service. If the nationalised gas industry should prove a rip-roaring success (I hope it will), I in my reactionary blindness will still fail to see that this will be a further argument for the absolute control of all doctors by the State.

The history of 1911–12 is undoubtedly dismal, but Mr. Layton omits an important particular which may well invalidate the depressing conclusion he seems happy to draw. I gather that the main issue then was the size of the capitation fee. Mr. Lloyd George, by a series of offers of increasing fees, got the profession at sixes-and-sevens when it was ill fitted for political warfare and completely inexperienced in the wiles of unscrupulous political warriors. In the past we have shown ourselves rather guileless at the political game; but experience teaches, and the profession today is highly organised and very wide-awake. Today, moreover, the issue is one of principle which is vital to both doctor and patient and to the social and moral welfare of the people at large. The doctors are certainly free to accept bribes and reject principle; but if they vote "No" for principle, Mr. Bevan, having started the bidding high, will be unable to increase his bribes and at the same time find support from the long-suffering taxpayer.

It was certainly news to me that the basic salary was "the main point of contention." It is only one of them, and in my opinion certainly not the main one. Be that as it may, the B.M.A. has clearly stated that it opposes the basic salary on the ground that it leaves the way wide open for a full-time salaried service when the Minister deems that the fruit is ripe and signs a regulation to that effect. Further, the association has said that it is in no way opposed to the giving of a temporary basic salary to help young practitioners to start. For Mr. Layton to suggest that the opposition to this measure is because it "does not suit men in middle age" is unworthy of a man of his standing.

I will tell Mr. Layton why the profession opposes the Act in its present form:

1. When the doctor's income comes from a variety of sources and he owns his own practice goodwill, he has the

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independence to defend both himself and his patients against onerous and unjust demands from the State or powerful private corporations.

2. If he surrenders this independence and lets the State become his full-time paymaster, he will no longer be fully free to defend either himself or his patients against the State, which is now the employer of many millions, and will, after July 5, be the insurance company for all.

I am one of "those under forty-five" to whom Mr. Layton appeals.

Woodford Green, Essex. L. P. GRAY.

MEDICINE AND THE STATE

SIR,—In your issue of Jan. 24 we are exhorted by Mr. Layton to trust the State. Well, many of us find this difficult or impossible—a sad commentary on the supposed excellence of democratic institutions.

For example, Army officers were recently granted nominal increases of pay, but the Treasury juggled with allowances and taxation so that many are much worse off, though the politicians do not tell us so. They may not strike, nor write to the newspapers, nor defend themselves in any way. Is it not possible that doctors would be treated similarly and be equally helpless?

Not long ago an approach was made to the Ministry to see if anything could be done to help practitioners whose practices had lost in value through the Act. The reply was that nothing could be done; in fact the Ministry did not care a bit.

So can we wonder that many doctors, and not for themselves alone, fear and distrust the State?

Hadley Wood, Herts. G. C. PETHER.

SIR,—Faith has been defined as the habit of seeing God in everything and everything in God. Yet, Sir, are you not exhorting us to substitute the State for God?

Dr. Coope last week expressed both a philosophic and a logical principle when he declared that the State can never compel good doctoring but can try to provide conditions in which good doctoring can flourish. Many of us believe that good doctoring requires freedom as its catalyst; and if this be withheld, then humanity which with science comprises the therapeutics of our art will wane and with it the sympathy between giver and receiver, which is the spirit of faith.

Windsor. CHARLES TAIT.

NO PERSONALITIES

SIR,—In today's newspapers you are reported as saying that "it is a plain if deplorable fact that a proportion of the profession are now objecting to the service chiefly because they object to Mr. Bevan." May I say that the vast proportion of us who object to it did so long before Mr. Bevan became Minister of Health?

It is also plain that a great many people both outside and inside the profession are in favour of the service solely because they like Mr. Bevan. This fact is just as deplorable as the one you mention.

Let us follow the example, therefore, of the British Medical Association and keep personalities and partisanship out of this question, realising always the difficulty of assessing motives for human behaviour.

Nantwich. OLIVER BLACKLEY.

THE PLEBISCITE

SIR,—The editorials of *The Lancet* have consistently sought to put the best construction on the National Health Service Act and to allay misgiving about the dictatorial powers it gives to the Minister. All the more disturbing now is the confirmation of the threat to the freedom of medicine in the stand taken recently by Mr. Bevan.

Quite clearly, he could delete from his Act the objectionable compulsory basic-salary clause, and allow doctors the protection of the courts, without affecting the health service to the public at all. Why does he refuse to do this? Can there be any other reason than that such an amendment would deprive the Government of the power it has taken to turn medical practice into a whole-time salaried Civil Service according to its declared policy, when it judges the circumstances to be opportune.

However much we may approve a National Health Service, is it not painfully clear, in spite of Mr. Bevan's personal disclaimer to *The Lancet*, that the issue that is forced upon us is the future State control of the individual doctor and the encroachment this would involve on the freedom of the people.

London, N.W.1. HERMON TAYLOR.

SIR,—As one of the small minority that opposed the resolution at the meeting at B.M.A. House on Jan. 27, and because the only dissentient voice that spoke at the meeting was shouted down (some tolerance of distasteful views should have been shown at what was nominally a "discussion"), I write to suggest that without being a supporter of the Socialist Government I believe that the reasonable and proper course is to accept the conditions of service as they stand. I should be sorry to feel that my views are as unrepresentative as the voting at the meeting appeared to indicate.

It is natural to wish to keep Medicine in this country unsullied by the swirl of political controversy, but such isolationism on the part of the profession would be selfish and ill-timed if any virtuous principle was thereby sacrificed. By those who advocate opposition it seems to be generally accepted that the Act in its present form will lead to the prostitution of medicine, and that to oppose it is truly to uphold the freedom of the profession, and the traditions of medical practice. No-one will deny that to infringe these principles would be generally obnoxious: the matter which should be in debate is whether the Act does necessarily infringe them.

Concrete objection to the Act appears to be limited to three main issues—the buying and selling of practices, the right of appeal beyond the Minister, and the basic salary. The remainder of the Act (the major portion) commands substantial agreement. One must admit, from whichever side one argues, that a logical case can be made both for and against two of these objections (and surely it is false to believe that mere acceptance of salary can enslave us); admittedly the denial of the right of appeal is arbitrary and introduces the possibility of abuse. Nevertheless I submit that, whatever one's attitude to these questions may be, there is a sufficient measure of basic agreement to make entry into the service desirable, if one realises that entering the service on the present terms does not invalidate the weapons of defence that the profession now possesses. The Minister might indeed have something to fear from the profession united in opposition because of, let us say, the wrongful dismissal of a member without appeal, and I am optimistic enough to believe that in or out of the service the profession would rally effectively if so provoked. The medical representative bodies will still have the support of the profession, and will still be able to exert very strong pressure—made even stronger by having a real case about which to fight.

And this raises my chief point. The basis of all opposition to the service is the potential abuse to which certain clauses in the Act might be put: the motives of the Executive are suspect, it may be with good reason. No ultimate good can, however, come of drastic action based solely upon suspicion; the traditions of medical practice, about which there has rightly been much recent eloquence, do not derive from such a niggardly attitude of mind. The time for strong opposition will be when and if some breach of confidence by the Executive has taken place, and is not while such action is only potential; I maintain that this opposition will be rendered more and not less effective if we have shown an earlier willingness to coöperate in a generous spirit. If the Executive in this country ever shows itself to be corrupt it is to be hoped that democracy is deeply rooted enough to overthrow it; if it cannot do so then the loss of medical freedom will be but a small part of the subsequent evils. One has, I think, to be quite unreasonably despondent to anticipate such a state of affairs.

Therefore I would urge the profession to join the proposed service, realising its imperfections, and to take the optimistic and not the pessimistic view of its potentialities. If in fact it works badly, and we cannot obtain readily the modifications that we desire, we shall then be able to resist with a far greater measure of public support. The Fighting Fund should be reserved for use in such a contingency. If on the other hand we fight now there will be aroused on all sides so much bitterness

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and animosity, so much scepticism, that the chance of any form of successful health service will be lost until a time when the medical profession becomes more wise.

Paddington Green Children's Hospital, London, W.2. M. E. MACGREGOR.

SIR,—I should be obliged if some of your readers can explain the following to me:

Quotation from B.M.A. plebiscite paper:

"How individuals vote will not be divulged."

Extract from B.M.A. leaflet "Why be fearful?":

"Those who fear that some men may change their No into Yes between February and July may be assured by the knowledge that the B.M.A. will know exactly to what extent this is occurring even if it occurs at all. The B.M.A. will persist in opposition only if the necessary majority is maintained. If the Noes are in the sufficient majority men will be asked to form small security groups in each division. They will be asked to enter into bonds with one another, and thus keep firm their Noes."

BEWILDERED.

*** The B.M.A. will inquire of the clerks of executive councils as to the numbers (not the names) of those who sign on. In this way it will know whether the necessary majority is being maintained. How individuals vote in the plebiscite will be revealed to no-one.—ED. L.

MEETINGS AT TEACHING HOSPITALS

SIR,—On several occasions, and notably at the time of the first B.M.A. referendum, the London teaching hospitals have been invited to take and publish the results of a vote on current medicopolitical questions. This, without exception, they declined to do.

Recently, however, the London Hospital, followed by some other teaching hospitals, including Westminster Hospital, has held such a meeting and the results have been published. A suggestively large number of members of the committees have not attended the meetings.

These meetings have established a most unfortunate precedent. They enforce public discussion of differences among men whose greatest common interests are the care of the sick of their hospital and the teaching of students. They make intolerable demands on the moral courage of junior members of the staff who, if dissentients, are forced to disagree publicly with men to whom they look for advancement.

The votes are taken in committees where a number of members of both hospital and school, such as laboratory workers, have no vote. The members of these committees are for the most part also represented on committees of the Royal Colleges, which up to the present have declined to prejudge a difficult question.

The greatest objection, however, to these meetings lies in the fact that the medical schools of the teaching hospitals are colleges of the University of London, and the staff of these hospitals are teachers in the university. These meetings have inevitably been followed by others attended by house officers and students. In this way, and for the first time in recent British university history, a section of the university has taken an active and partisan part in a political imbroglio.

In certain parts of the world the universities have long been political pawns, with reservoirs of active young men who have time to burn. They have proved valuable tools in the hands of cynically minded political parties. I recall, for example, watching the antics of the Cairo Medical School demanding the ejection of the British from Egypt.

Such a use of university organisations is to be deplored, and in an epoch of vigorous political and economic experiments the precedent, if followed, might lead to most regrettable developments, not always of the same political colour. I trust that no further meetings of this kind will be held.

London, S.W.3. R. J. V. PULVERTAFT.

TIT-BIT

Mr. James Fisher and Mr. R. A. Hinde write to thank the many readers who responded to their request of Jan. 3 (p. 42) for information about birds opening milk bottles. They regret their inability to reply to each informant individually.

Public Health

Food Standards Committee

THE Minister of Food has announced the appointment of a Food Standards Committee with power to review the composition of foods, other than liquid milk. This committee will replace the interdepartmental committee on food standards set up in 1942, and will advise the Ministers of Food and Health and the Secretary of State for Scotland on the regulations that can be made under the Defence (Sale of Food) Regulations, 1943; and the Food and Drugs Act. The committee will recommend food standards, based on quality and nutritional value, designed to protect the consumer against the sale of inferior products. It includes members nominated by the Food Manufacturers' Federation, the Medical Research Council, and various other bodies, as well as Government representatives. The following have been appointed:

N. C. Wright, D.SC., chief scientific adviser to the Ministry of Food (chairman); G. G. Barnes (vice-chairman); C. A. Adams, B.SC.; P. N. R. Butcher; Prof. S. G. Cowell, F.R.C.P.; Sir Jack Drummond, D.SC., F.R.S.; A. Glover, M.SC.; Sir Harry Hague, M.P.S.; Sir Harry Jephcott, M.SC.; J. M. Johnston, F.R.C.S.E.; G. W. Monier-Williams, PH.D.; J. R. Nichols, D.SC.; R. W. Sutton, B.SC.; and G. Taylor. The secretary is K. R. Allen, Ministry of Food.

Some London Statistics

It is evidence of a well-formed public-health service that mortality and morbidity trends in London, the site of England's worst bombardment, were hardly deflected by the war. Sir Allen Daley's latest report [1] shows an almost uniform improvement in all health statistics over the past ten years. Thus the neonatal mortality, which was 22·9 per 1000 live births in 1936–40, rose, it is true, to 28·4 in 1941, but thereafter fell quickly, being 23·0 in 1945 and 22·2 in 1946. The infant mortality also reached a new low record, of 38 per 1000 live births, in 1946; and maternal mortality after rising sharply in 1941 (a result of the bombardment, with its temporary lowering in standards of care), also fell fairly steadily to a new low record, in 1946, of 1·26 per 1000 live births. The effect of the sulphonamide drugs appears in the reduction of deaths from puerperal sepsis, which has now lost its place as the most serious risk of pregnancy.

There is good evidence of the effects of the diphtheria immunisation campaign not merely in saving lives but in reducing the numbers attacked. The attack-rate of diphtheria has fluctuated in the past fifty years over a range of about 1·5 to 3·0 per 1000 living; so a decline could only be regarded as significant if it fell below 1·0. A fall in 1939, when less than a quarter of the children were immunised, is attributed to the evacuation plan, which thinned out the children in London, and reduced chances of contact. There was a rise in 1941, when many children had returned home, and the percentage immunised was still only 24; but since that time immunisation has been increasingly accepted—74% of children being protected by 1946—and the attack-rate since 1944 has been less than 0·5. Ministry of Health figures show that the death-rate among the unprotected is 30 times as great as among the immunised.

Deaths from diarrhœa and enteritis in children under two fell in 1946 to 4·08 per 1000, an improvement on the previous low record of 1940 and 1941. Measles is no longer the killing disease it was: the antibiotics have seen to that; from 1·43% in 1921–25 the case-mortality fell to 0·2% in 1941–45.

Death-rates from pulmonary and non-pulmonary tuberculosis, which reached a peak in 1941—about 70% above those for 1938—have already fallen to below the 1938 figure; but the incidence of new pulmonary cases in 1946 was still 23% above the 1938 incidence. Available beds for the treatment of tuberculosis were still declining in numbers because of the scarcity of nursing staff; and early cases were waiting longer than ever for treatment. A limited scheme of home treatment was therefore

1. London County Council: Report of the County Medical Officer of Health and School Medical Officer for the year 1946. Staples Press Ltd., 14, Great Smith Street, London, S.W.1. Pp. 86. 2s. 3d.

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started and has proved successful; collapse therapy is given, the patients being taken to and from the tuberculosis dispensary by ambulance. Besides ensuring that patients receive treatment early, this scheme has made sanatorium treatment unnecessary for some, and so has spared hospital beds.

Payments to Public Vaccinators

Of late years the Ministry of Health has been unable to inspect the work of public vaccinators; and while "awards," at the rate of 1s. per successful vaccination, have still been paid to those whose work had previously been inspected, no awards have been paid to others who became public vaccinators after inspection was suspended. The Ministry of Health, to which the British Medical Association applied, has announced that back-payment of awards is to be made to these vaccinators, subject to a satisfactory certificate from the medical officer of health; and applications from former public vaccinators who have received no award will be considered.

Morbidity in British Zone of Germany

The Foreign Office announces that out of a population of 22,344,800 in the British zone of Germany there were 9376 deaths from pulmonary tuberculosis during the first nine months of 1947. Comparative figures for 1946 and 1947 for the various Länder were:

	Population	*1947*	*1946*
Schleswig-Holstein ..	2,652,500	1073	1011
Hamburg	1,426,900	747	836
Niedersachsen	6,455,300	2494	2205
North Rhine/Westphalia	11,810,100	5062	5170
	22,344,800	9376	9222

The large number of refugees in Schleswig-Holstein and Niedersachen should be taken into account when considering the figures.

Nutrition Survey.—Owing to the large number of public servants reporting sick in Hamburg, a nutrition survey team examined 367 office workers in the last week of November; 49·6% were found to be in a moderate state of nutrition, 29·7% in good condition, and 20·7% in fair-to-poor condition. Loss of weight was noticeable, but there were few signs of hypovitaminosis or actual malnutrition. No case of hunger-œdema was found, but about 3% had suffered from it. There were also no cases of open tuberculosis, but 7% were under observation at their local clinics as either healed or suspected cases. More than 75% of those seen were normal consumers, but extra food was obtained illegally by 84%.

Poliomyelitis and Polioencephalitis

In the week ended Jan. 24 notifications of poliomyelitis numbered 35 (47) and of polioencephalitis 3 (3). Figures for the previous week are shown in parentheses. This is the largest fall in notifications for some weeks. Multiple cases of poliomyelitis were reported from: London 4 (3), Chester 2 (4), Durham 2 (0), Lancashire 5 (4), Lincs, Kesteven 2 (0), Middlesex 4 (3), and Yorks, West Riding 2 (0).

Revision of Askwith Scale

The interim revision of the Askwith memorandum on payment to whole-time public-health medical officers has now been replaced by a new revision. In a circular (12/48) to local authorities the Ministry of Health announces that the new scale is to operate retrospectively from July 1, 1947. The increases are as follows:

Salary by original memorandum *	Increase on original salary	
	Interim revision, 1946	Present revision
Not exceeding £700.. ..	30%	35%
Exceeding £700, but not exceeding £1000	20%	30%
Exceeding £1000	10%	25%

* The increase is based on the minimum of incremental scales wher these are in operation.

Parliament

FROM THE PRESS GALLERY

Cut in Home Forces' Rations

Mr. A. V. ALEXANDER, Minister of Defence, announced in the House of Commons on Jan. 28 changes in the ration scales for Servicemen in home establishments, which would bring them into line with the food available to civilian workers. The changes were regarded as reasonable in the circumstances by a committee representative of the Ministry of Food, the Service departments, and medical opinion. They would save about 11 million dollars a year. He was also examining overseas ration scales to ascertain what economies were possible in hard currency expenditure.

Under the new scale the amount of meat and offal would be reduced by 12·25 oz. a week, bacon and ham by 4·5 oz., and cheese by 1·75 oz. By way of compensation fats would be increased by 2·75 oz., and sugar by 3·5 oz. The net calorie reduction, which he assessed at not more than 30 calories a day, would be met by an increase of bread and by additional purchases of fish, vegetables, and such other unrationed items as were available.

Mr. Alexander said it was recognised that these adjustments would materially alter the character of the Services' dietary. Half of the adjustments would have effect from Feb. 14 and the balance three months later.

Extra Milk for the Old

On Jan. 30, on the motion for the adjournment, Mr. C. W. DUMPLETON appealed for a little extra milk for old people, especially those living alone. Though he recognised the importance of adequate milk for expectant and nursing mothers, invalids, and growing children, he thought there was a case for giving priority to the old people over, say, milk for children in schools.

In reply Dr. E. SUMMERSKILL divided milk priorities into the physiological group (containing expectant and nursing mothers, children, babies, and adolescents), and the pathological group, including those suffering from diseases alleviated by extra milk. After making allocations to priority and non-priority groups there was left a marginal allowance of 800,000 gallons of milk. To give 6½ million old-age pensioners one pint of milk a day, as she would like to do, would require another 5½ million gallons.

It had been suggested that some of the children's priority allowances should be diverted to the old people. Milk was a food of such importance that priority must be given to those who depended on it for its body-building properties. The animal protein of milk was indispensable to children, and it also provided half the calcium in their diet. Without adequate calcium their bones would be imperfectly formed. Normal adults, including old people, had sufficient calcium stored in their bodies to prevent them developing any deficiency disease.

Attempted Rape

On Jan. 30, Mr. K. G. YOUNGER, under-secretary of State for the Home Department, moved the second reading of this short Bill, which raises the maximum penalty for attempted rape from 2 years' imprisonment to 7 years' penal servitude. His Majesty's judges, Mr. Younger explained, had complained for a long time, as serious cases came before them, of the inadequacy of the present penalty. For the full offence of rape the maximum penalty was penal servitude for life, and the judges had pointed out that an attempt may cause the victim all the indignity and terror of the full offence. The number of convictions, as in so many crimes of violence, had risen since the year before the war—there were 40 convictions in 1938, 100 in 1945, and 65 in 1946.

Lieut.-Colonel M. LIPTON thought it unfortunate that the Bill should be introduced at a time when the trend of modern ideas in criminal punishment had been to reduce penalties rather than to increase them. There seemed to him no evidence that convictions for sexual offences (which included other things beside rape) were increasing. There were 1004 convictions in 1913, 729 in 1938, and 850 in 1945. He agreed that for a few cases

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the maximum penalty was inadequate, but pointed out that it was always undesirable to legislate from a few instances. With these provisos he welcomed the Bill.

QUESTION TIME

B.M.A. Plebiscite

Mr. S. TIFFANY asked the Minister of Health whether he was aware of the nature of the plebiscite in which doctors were being asked to participate, in regard to the National Health Service Act; and if he had any statement to make.—Mr. A. BEVAN replied: I understand that each doctor has to sign his name on the voting paper, with his address and professional particulars, and that the association conducting the ballot is itself engaged in a campaign to induce the doctor to vote one way. This House may well feel that this procedure is a long way removed from the secret ballot and the workings of democracy as we know it in this country and that it is bound to cast doubt on the validity of the result.

Mr. SOMERVILLE HASTINGS: Will the Minister take steps to see that all the doctors concerned have knowledge of what he has just told the House?—Mr. BEVAN: The doctors, of course, will be informed when they receive the plebiscite form itself, because they will see that it is not a secret vote but an open ballot.

Mr. J. BAIRD: As the doctors seem to be taking the law into their own hands in this matter, does not the Minister think that this House should have an opportunity of expressing its views on this attempted blackmail?—Mr. BEVAN: This is a question which ought properly to be addressed to the Prime Minister or to the Leader of the House, because it involves procedure and giving an opportunity for a debate. As far as I am concerned, the Government's case is so strong that I should welcome an opportunity of deploying it.

Mr. WINSTON CHURCHILL: There is no compulsion, of course, on any medical man to take any notice of this paper unless he likes?—Mr. BEVAN: None at all, as I understand it, but, of course, open votes of this description always give rise to the possibility of intimidation.—Mr. CHURCHILL: Intimidation?—Mr. BEVAN: It was because open votes of this sort were removed from our constitutional practice that the secret ballot was established. Fear of intimidation is the reason for the secret ballot.

Dr. B. STROSS: In view of the great importance of this matter to everyone, may I ask the Leader of the House whether he will give us an early date for a debate on it?—Colonel M. STODDART-SCOTT: Why should signing a ballot form invalidate a vote? In university elections you sign the ballot form. Any doctor, whether he is a member of the B.M.A. or not, and I myself am not, has no need to vote unless he wishes, and if he does not wish to sign his ballot form, he need not do so.—Mr. S. SILVERMAN: Is there not all the difference in the world between signing a ballot paper in a university election, where the university takes no part in the election, and is indifferent to the result, and signing a ballot paper to be sent to an association which has already taken sides, indicated a preference, and hopes for a result? The SPEAKER intervened to say that this seemed to be a little hypothetical.

Speaking later on the question of the future business of the House Mr. H. MORRISON, Lord President of the Council, said that if a debate took place it would have to be on a somewhat wider issue than the plebiscite. It might cover outstanding issues in dispute between the Minister of Health and the British Medical Association. The Government would not be unsympathetic towards a debate as early as possible.

[The B.M.A. reply to Mr. Bevan stated: Of course doctors will be asked to sign this plebiscite form as they were invited to sign the last. Mr. Bevan did not object then. How else can a postal vote be conducted if abuse is to be avoided? Voting papers in Parliamentary elections for university seats—conducted by post—are not only signed, but also witnessed in addition. A definite assurance is printed on every plebiscite form issued from B.M.A. House that how individual doctors vote will not be divulged, and that assurance will be kept. The British Medical Association is no less honourable in keeping its undertakings than is Mr. Bevan. The whole arrangements for the plebiscite and the counting are under the detailed control and supervision from start to finish of an eminent London firm of accountants who will certify the result. When the results of the plebiscite have been computed the voting papers will be destroyed. As for intimidation there will be no intimidation and the medical profession will not yield to intimidation by Mr. Bevan. Mr. Bevan, apparently fearful of the result of the plebiscite, is making a move timed to prejudice the result in advance. He will not succeed.]

Censorship

Colonel STODDART-SCOTT asked the Minister if the doctors and dentists who entered the National Health Service would have complete freedom to publish articles and books without having to seek permission; and if he would give an assurance that there would be no attempt to suppress freedom of publication.—Mr. BEVAN replied: In so far as I am concerned there will be no restriction whatsoever in the National Health Service on publication of scientific or clinical writings.

Open Shop

Mr. H. C. ATTEWELL asked the Minister whether membership of a trade union will be required as a condition of employment in the National Health Service; and whether existing professional bodies will have representation in the machinery for the negotiation of remuneration and conditions of service?—Mr. BEVAN: I hope that persons employed in the National Health Service will be encouraged to belong to their appropriate organisations, but it will not be a condition of employment, and there will be no pressure upon anyone to belong to any organisation, whether professional or trade union. Arrangements for setting up Whitley machinery in the National Health Service are well advanced, and, for a large part of it, provisional employees' sides have already been set up. No fewer than 25 professional organisations are represented on these sides, and there is no truth in the suggestion that such organisations will not have representation as appropriate.

Registration of Foreign Doctors

Mr. HASTINGS asked the Minister how soon any of the doctors covered by section 3 of the Medical Practitioners and Pharmacists Act could hope to secure permission to practise in this country.—Mr. BEVAN replied: Applications for registration under the section are a matter for the General Medical Council. Certain preliminary work has been necessary before formal applications could be invited. I understand that this is nearly complete.

I.M.S. Compensation Rights

Mr. ATTEWELL asked the Minister if he was now in a position to say whether the National Health Service was to be classed as a permanent pensionable service; and whether officers who, until recently, were employed in the Indian Medical Service, Military Department, would be called upon to refund compensation money paid to them when discharged from the service, should they be accepted as doctors under the National Health Service. Mr. BEVAN replied: The answer to the first part of the question is Yes; to the second part No.

Future of Panel Doctors

Sir HENRY MORRIS-JONES asked the Minister of Health what would be the position under his recent regulations when the National Health Insurance Act came into operation on July 5 of panel practitioners who found themselves unable to take up service under it, but who intended continuing to practise.—Mr. BEVAN replied: These practitioners, like others, will be able—if they wish—to take part in the new National Health Service after July 5. The old National Health Insurance service will be superseded by the new arrangements at that date. A doctor may also confine himself entirely to private practice.

Rations in Germany

Mr. W. SHEPHERD asked the Secretary of State for Foreign Affairs to what extent there had been failure to meet the rations in Germany in the past three months.—Mr. H. MCNEIL replied: The daily ration of 1550 calories for the normal consumer in the British Zone was not met to the extent of 145 calories in October, 203 calories in November, and 260 calories in December, 1947. During the current ration period which ends on Feb. 1 the deficit is likely to be the same as in December. It is expected that the differential ration system to be operated in the February ration period will help distressed urban areas.

Rations for Nurses

Air Commodore A. V. HARVEY asked the Minister of Food if he would now increase the rations of hospital nurses and also district nurses, in view of their long hours of work.—

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Mr. J. STRACHEY replied: I am afraid that I could not base differential rations on the number of hours worked by the individual.—Air Commodore HARVEY: Is the Minister aware that district nurses spend all hours of the day and night out in the country, and are thus unable to do their shopping; and that in the case of hospital nurses, it will not assist the recruiting of these young ladies if they are to work all hours of the day and night and be completely underfed?—Mr. STRACHEY: If there is a case for differential rationing for any trade or profession it should be taken up through the Trades Union Congress.

Replying to Mr. FRANK BYERS, Mr. STRACHEY added that if the nurses had an organisation of their own they should apply through it. If they had no such organisation they should get one.

Obituary

BERTRAM ARTHUR LLOYD

CH.M. BIRM., M.B. LOND., F.R.C.S.

Mr. Bertram Lloyd, consulting surgeon to the Birmingham United Hospital and emeritus professor of forensic medicine in the University of Birmingham, died on Jan. 22.

Born in 1884 in Birmingham, he was educated there at King Edward's School and at the university, taking his M.B. Lond. in 1909 and his F.R.C.S. two years later. After holding house-appointments at Charing Cross and Great Ormond Street, he returned to Birmingham as senior resident medical officer at the Queen's Hospital. In 1913 he was appointed to its honorary staff and also to that of the Children's Hospital. For many years he was consulting surgeon to the Smallwood Hospital, Redditch. In 1932 he was appointed to the chair of forensic medicine, and the following year the university conferred on him, ex officio, the degree of CH.M. In 1941 failing health interrupted his work as a surgeon and in 1942 he retired from his chair.

"A just appreciation of Bertram Lloyd," writes H. F. H., "would record that his outstanding qualities, familiar to his many friends but not presented for public scrutiny, lay somewhat outside his professional career. For he was a man of exceptional intellectual gifts, cultivating them in the tradition of that long line of medical scholars that stretches from Sir Thomas Browne to our own day; though his mild and modest nature, averse either to prominence on a platform or contention in a committee, made him shrink even from the publicity of print and he published little. Mathematics and music, the science and the art that superficially seem such poles apart and yet are so often associated, were his earliest loves. In youth he was a pianist of high professional standard, until the claims of surgery forbade the daily practice essential for high proficiency. Later the study of languages attracted him: he became interested in ancient and oriental scripts and acquired a working knowledge of most European tongues. A great traveller, he visited in turn nearly all the European countries from the Arctic Circle to Sicily, with a hunger for high hills which a physique never very robust did not deter him from indulging."

In 1930 Mr. Lloyd married Dr. Hilda Shufflebotham, who now holds the chair of obstetrics and gynæcology in the University of Birmingham.

ROSCOE REID GRAHAM

M.B. TORONTO, F.R.C.S.C.

Mr. Roscoe Graham, who died on Jan. 17, was senior surgeon to the Toronto General Hospital and assistant professor of surgery in the University of Toronto. We have received the following appreciation from Sir Heneage Ogilvie:

"Roscoe Graham combined with a charming personality and unusual simplicity of character all those qualities that make for real greatness in surgery—a high sense of duty, a deep love for his fellow men, indomitable energy and strength to work long hours without fatigue, courage, the ability to make quick decisions, skilled and gentle hands, originality of thought, and an uncommon gift for clear thinking and vigorous expression that made him one of the best teachers and writers of his time. A leader in abdominal surgery, his writings had a profound influence on the progress of gastro-enterology. He was the first man successfully to remove an islet tumour of the pancreas and as a result he attracted similar cases to Toronto from all over the world.

"Strikingly handsome, tall, with an upright athletic carriage and a pink boyish face contrasting oddly with hair that had been snowy white since early manhood, Roscoe seemed to radiate happiness. He did everything well, whether in work or in sport, and delighted in doing it well. He was an expert skier, and he fell dead in the snow at the end of a day during which he appeared to have been in perfect health, enjoying his favourite sport in the place he loved. Such a death is one that all might envy, but it came too soon. He had passed his 58th birthday only a few days before and he was in his full vigour as an operator and a teacher, exercising that leadership which during the last thirty years has influenced so many young surgeons in Canada and Britain to their lasting good."

Diary of the Week

FEB. 8 TO 14

Monday, 9th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. H. L. Marriott: Fluid Balance Variations.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. Victor Riddell: Carcinoma of the Breast. (Hunterian lecture.)
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
8.30 P.M. Dr. J. F. Wilkinson: Folic Acid. Mr. Hamilton Bailey: Differential Diagnosis of Tuberculous Cervical Adenitis. Dr. Geoffrey Evans: Potassium Thiocyanate in Hypertension.
ROYAL SOCIETY OF ARTS, John Adam Street, W.C.2
4.30 P.M. Sir Jack Drummond, D.SC., F.R.S.: Fats in the Life of the Nation. (Second Cantor lecture.)
INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
2.30 P.M. Mr. V. E. Negus: Nose, Nasopharynx, and Paranasal Sinuses.

Tuesday, 10th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. G. S. Wilson: Public Health Laboratory Service. (First Milroy lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. F. E. Stock: Surgical Approach to Hypertension.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. H. Corsi: Diseases of the Nails.
CHELSEA CLINICAL SOCIETY
7.30 P.M. (South Kensington Hotel, 47, Queen's Gate Terrace, S.W.7.) Dr. C. Keith Simpson: Difficulties in the Science of Crime Detection.

Wednesday, 11th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Hedley Visick: Study of the Failures after Gastrectomy. (Hunterian lecture.)
ROYAL FACULTY OF PHYSICIANS AND SURGEONS, 242, St. Vincent Street, Glasgow
5 P.M. Dr. J. W. Affleck: Administrative and Clinical Problems of Chronic Sickness and the Diseases of Later Life. (Watson lecture.)

Thursday, 12th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Professor Wilson: Public Health Laboratory Service. (Second Milroy lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Rainsford Mowlem: Bone, Cartilage, and Fascia Transplants.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. W. J. O'Donovan: Psychosomatic Dermatoses.

Friday, 13th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. G. E. Beaumont: Tumours and Cysts of the Chest. (Second lecture.)
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. Stanley Way: Anatomy of the Lymphatic Drainage of the Vulva and its Influence on the Radical Operation for Carcinoma. (Hunterian lecture.)
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. R. Sleigh Johnson: Acute Respiratory Infections.
BIOCHEMICAL SOCIETY
2 P.M. (Westminster Hospital medical school, Horseferry Road, S.W.1.) Short papers and demonstrations.
ROYAL MEDICAL SOCIETY, 7, Melbourne Place, Edinburgh
8 P.M. Prof. R. J. Kellar: Princess Charlotte and the Uterine Hæmorrhage of Pregnancy.
LEEDS AND WEST RIDING MEDICO-CHIRURGICAL SOCIETY
8.30 P.M. Prof. W. S. Craig: The Home, the Family Doctor, and the Hospital in Relation to Child Care.

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Notes and News

MEDICAL PRACTICES COMMITTEE

THE *British Medical Journal* of Jan. 31 publishes letters exchanged between the Ministry of Health and Dr. Charles Hill as secretary of the Negotiating Committee.

The Minister proposes that the chairman of the Medical Practices Committee (to be established under Section 34 of the National Health Service Act) shall receive at the outset £2000 a year, and the other members 7 guineas a day, and that their normal period of office shall be three years. On Jan. 2 he asked the Negotiating Committee for observations on his proposals and for the names of persons whose appointment to the Medical Practices Committee he should consider. Dr. Hill on Jan. 10 answered that "not until the profession has determined its attitude to the service as a whole will it be possible for the Negotiating Committee to consider putting forward such observations and suggestions, its action then depending upon the character of the profession's decision on the larger issue." In reply on Jan. 10 the Minister noted that "the Negotiating Committee are unwilling to join him in the consultation which he has offered regarding the choice of medical members for the Medical Practices Committee. If, at any time before he has completed the constitution of this committee in accordance with the Act, the Negotiating Committee wish to offer any suggestions he will, of course, still be happy to consider them."

The two final letters are dated Jan. 23 and 26. In the first Dr. Hill says that when he wrote on Jan. 2 the Minister was fully aware that the Negotiating Committee could not possibly compromise itself and the profession by nominating medical members for a body the need for which is one of the subjects in dispute: his action in sending his request at this time suggested that he was trying to relieve himself of the legal obligation to consult the profession. To this the Minister replied that he is responsible for bringing the Act into operation, and must set up, stage by stage, the various bodies for which the Act provides. The stage at which the Medical Practices Committee needs to be considered having arrived, he offered the Negotiating Committee the opportunity of consultation, "as he would himself prefer—and has often made clear—to act throughout in the closest consultation with the profession." He wishes and intends, he said, to continue to offer the opportunity at all similar stages in the preparation of the new service.

ASSOCIATION OF CLINICAL PATHOLOGISTS

AT this association's coming-of-age dinner, held at the Piccadilly Hotel, London, on Jan. 30, Dr. Cuthbert Dukes, the president, proposed an unusual toast—The Past, in honour and gratitude.

Sir Wilson Jameson, chief medical officer of the Ministry of Health, said that the story of the association was that of a group of sturdy men who knew what they wanted; it was largely the story of Dr. S. C. Dyke. In the old days pathology was dominated by the morbid anatomists, who were none too sympathetic towards the younger branch of clinical pathologists. After the 1914–18 war, with little encouragement from hospitals and universities, these began to develop their own services, but they were still widely held to be at the beck and call of the honorary staff. In 1927 a letter in the medical press, with eleven signatories, led to the foundation of what was called at first the British Pathologists' Association, and as time went on their position grew stronger. Pathology was really put on the map, however, by the late war and by the efforts of Sir Philip Panton. In the end Sir Philip had got almost everything he set out to get, except proper remuneration for the pathologist; and Sir Wilson hoped he would succeed there too before long. Clinical pathology had now a foothold in the teaching hospitals, thanks partly to the Goodenough Committee and especially Dr. Janet Vaughan. The battle, indeed, was now won, and he coupled the toast of The Association with that of Dr. Dyke—a former Rhodes scholar from Canada, and "just the sort of person one finds in missionary work"—who had done the secretarial work, had kept the association before the profession, and had carried the flag overseas. Dr. Dyke (whose birthday gaiety infected the whole gathering) said he had never regarded himself as the founder: "societies like this have no founder; they just have to be." The reason for starting the association was that the universities were paying no attention to the provincial hospitals: the leaders were not doing their job. "When the New Jerusalem descends from heaven on the appointed day, arrayed like a bridegroom, all will be done"; but in 1927 it was not being done. At first the association was not highly regarded; but the stone that the builders rejected had become a pretty important brick in the edifice; the fowls of the air and the beasts of the field were resting in the branches that came from the grain of mustard seed. The association had always concerned itself with the country as a whole: at the end of last century everything centred round London; but this was not so in the days of England's greatness, and the bulk of medical work was still done in provincial hospitals. The present secretary, Dr. W. H. McMenemey, was doing great work in developing provincial branches, and abroad the association was the parent of the European Association of Clinical Pathologists, now incorporated in the World Federation of Associations of Clinical Pathologists. Clinical pathology was a peculiarly suitable meeting-place for the different branches of medicine.

Responding for The Guests (proposed by Dr. J. G. Greenfield) Sir Alexander Fleming, F.R.S., said that the association had filled a gap and grown to be a power. He felt that it was Almroth Wright who really started this revival of pathology by his insistence on the man in the laboratory seeing the patient. Dr. Norah Schuster said that in the old days the unpopularity of women in medicine was bad for their morale. When they entered the Association of Clinical Pathologists it was like coming into a ray of warm sunshine; and she therefore asked her women colleagues to drink a toast probably unique in history—The Gentlemen. After other unofficial toasts the evening dissolved in bonhomie.

SUPERANNUATION OF HOSPITAL OFFICERS

IN a circular (11/48) to voluntary hospitals, the Minister of Health declares his intention that no hospital officer shall lose superannuation benefits which he would have had in his present employment simply because the intention of the governing body was not declared before March 19, 1946. Where the purchase of annuities is not possible, the Minister will not rule out a declaration of intention subsequent to that date provided the hospital board affirms that the intention existed previously and has not been influenced by the forthcoming transfer of the hospital.

ST. LEONARD'S HOSPITAL REINSTATED

THE General Nursing Council for England and Wales recently withdrew their recognition of St. Leonard's Hospital, Shoreditch, as a training school for nurses. Mr. Aneurin Bevan, the Minister of Health, has allowed the appeal, heard last November, of the London County Council against this decision and has notified the General Nursing Council and the L.C.C. accordingly. The appeal was heard by Mr. V. Zachary Cope, F.R.C.S., and Miss M. F. Dykes, S.R.N., who were appointed for this purpose by the Minister.

University of Oxford

On Jan. 22 the following degrees were conferred:

B.M.—J. F. Hale, J. E. Middleton, C. A. B. Clemetson, B. W. Cole, D. C. Turk,* R. W. Emanuel,* Ian Kelsey Fry,* G. L. T. M. Patey,* Christine L. Miller.*

* In absentia.

Royal College of Obstetricians and Gynæcologists

At a meeting of the council held on Jan. 24, with Mr. William Gilliatt, the president, in the chair, W. A. Dafoe was admitted to the fellowship, and S. J. Aptekar, Solomon Bender, Elizabeth McCallum, and Dorothy M. Satur to the membership. The following were elected to the membership:

S. G. Aitken, S. C. Anderson, Islay C. Barne, Wallace Barr, Fred Benjamin, Margaret E. M. Boulton, J. M. Bowen, J. C. McClure Browne, E. C. Bryant, J. T. Burrowes, R. W. Burslem, Agnes U. Campbell, A. W. Chester, John Crawford, L. A. Cruttenden, P. C. Denham, John Dunlop, Sidney Evans, J. F. Foulkes, D. C. Galloway, S. F. Hans, Betty Hargreaves, J. R. Hassard, Rosa Hertz, J. B. Hurll, P. S. Jaikaran, Mary S. Jolly, E. W. Jones, M. M. Kriseman, Sylvia Lerer, Una G. Lister, Florence P. Logan, J. T. Louw, S. D. Loxton, Silvia C. Lucas, D. S. Matthews, A. M. Michalowsky, N. V. Mody, Cecilia M. Murray, G. S. Musgrove, M. J. D. Noble, Khorshed Pasricha, R. G. Patel, A. E. Perera, P. T. Por, R. W. K. Purser, T. F. Redman, O. A. Schmidt, Francis Shaw, B. H. Shearer, D. M. Sheppard, B. S. Surti, D. A. Thomson, J. G. Thurston, S. N. Upadhyay.

On behalf of the college Sir William Fletcher Shaw is shortly to visit various centres in Canada to discuss with fellows and members of the college, matters affecting the practice of obstetrics and gynæcology in the Dominion. He hopes to leave England in April.

Patients' Paintings

Lord Horder will open an exhibition of pictures by patients from the mental treatment centre of Hill End Hospital, St. Albans, at 3 P.M., on Wednesday, Feb. 11, at Foyle's Galleries, Charing Cross Road, W.C.2.

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Royal College of Physicians of London

At a meeting of the college held on Jan. 29 with Lord Moran, the president, in the chair, the following resolution was passed:

"That after the plebiscite and the special representative meeting of the British Medical Association (March 17), a special comitia should be held to determine what action could most usefully be taken in the interests of the public and the profession as a whole."

The following candidates having satisfied the censors' board were elected to the membership:

J. L. Adams, M.B. N.Z., D. G. Adamson, M.B. St. And., Y. E. Ahmad Azab, M.B. Cairo, Daphne S. A. Anderson, M.B. Lond., W. F. Anderson, M.D. Glasg., W. B. Armstrong, B.M. Oxfd, Philip Arnold, M.B. Lond., G. P. Baker, M.B. Camb., C. W. Bartley, M.D. McGill, B.M. Oxfd, A. G. Beckett, B.M. Oxfd, A. B. Black, M.B. Birm., V. M. Borrelli, M.B. Lond., P. F. Borrie, M.B. Camb., B. F. Brearley, M.B. Camb., H. T. Calvert, M.B. Camb., J. A. G. Carmichael, L.R.C.P., major R.A.M.C., H. S. De Silva, M.B. Lond., L.M.S. Ceylon, P. E. Dipple, M.D. Lond., Anthony Divaris, M.B. Cape Town, A. St. J. Dixon, M.B. Lond., H. G. Dunn, M.B. Camb., A. M. Edwards, M.D. Lond., F. J. Fish, M.B. Lond., Constance C. Forsyth, M.B. Edin., J. L. Frew, M.D. Melb., A. N. Ganguli, M.B. Patna, T. J. B. Geffen, M.B. Lond., Janet B. Gorham, M.B. Witw'srand, Norman Green, M.D. Toronto, Hyman Grusin, M.B. Witw'srand, R. T. S. Gunn, M.B. Glasg., R. T. Hastings-James, M.B. Camb., I. F. Hayali, M.D. Bagdad, Jack Henneman, M.B. Lond., H. W. Hickman, M.B. Birm., J. A. Hildes, M.D. Toronto, S. W. Hinds, M.D. Lond., John Hirst, M.D. Leeds, W. S. Holden, M.B. Manc., C. A. Holman, M.B. Lond., F. H. Howarth, M.B. Camb., I. P. Jaffe, M.B. Cape Town, H. W. F. Jones, M.B. Camb., Henriette, Lackner, M.B. Leeds, G. de J. Lee, M.B. Lond., Julius Lee, M.B. Lond., Donald Longson, M.B. Manc., J. B. Lowe, M.B. Edin., D. B. Macaulay, M.B. Lpool, E. McC. McGirr, M.B. Glasg., A. G. MacGregor, M.B. Glasg., Maurice McGregor, M.B. Witw'srand, C. S. McKendrick, M.B. Camb., T. P. Mann, M.B. Lond., P. M. C. Mark, M.D. Lond., A. S. Mason, M.B. Camb., R. M. Mason, B.M. Oxfd, J. D. H. Matthews, M.B. N.Z., W. B. Matthews, B.M. Oxfd, D. A. D. Montgomery, M.D. Belf., J. A. U. Morgan, M.B. Lond., J. E. Morris, M.B. Manc., A. H. Nakhooda, M.B. Bombay, F. W. Nash, M.B. Lond., William O'Brien, M.B. Lond., D. F. D. O'Neill, M.D. Belf., A. G. Parks, B.M. Oxfd, J. C. Pease, B.M. Oxfd, John Perrin, M.B. Camb., John Pinching, B.M. Oxfd, P. E. Polani, M.D. Pisa, A. S. Ramsey, M.D. Belf., D. G. B. Richards, M.B. Birm., P. H. Rogers, M.B. Camb., A. J. Rook, M.B. Camb., E. S. Rowbotham, M.D. Durh., Jack Rubie, M.B. Lond., Jack Rudolph, M.B. Witw'srand, W. A. M. Seldon, M.B. Sydney, S. A. Sewell, M.B. Melb., S. C. Sheth, M.B. Bombay, Victor Solomon, M.B. Witw'srand, J. P. Sparks, M.D. Durh., Yu Hans Tang, M.D. Shanghai, M.D. Louvain, Jean S. Taylor, M.B. Glasg., W. H. Trethowan, M.B. Camb., O. L. Wade, M.B. Camb., J. K. Wagstaff, M.B. Camb., G. D. Walker, B.M. Oxfd, R. L. Ward, M.B. Lond., A. D. Weatherhead, M.B. Lond., R. H. Wheeler, M.B. Camb., R. H. White-Jones, M.B. Lpool, E. G. Wilkins, M.D. Lond., J. M. Wilson, M.B. Lond., R. H. L. Wolfsohn, L.R.C.P., B. S. B. Wood, D.M. Oxfd.

Licences to practise were conferred upon the following 100 candidates (78 men and 22 women) who have passed the final examination of the Conjoint Board:

D. B. Allbrook, Sophie Bard, Marjorie M. Barr, A. J. Beale, E. L. I. Boesen, T. R. Bomonji, J. M. N. Boss, W. M. Brent, P. P. M. Browne, R. St. J. Buxton, P. S. Carton-Kelly, D. B. Cathcart, Elizabeth H. Clow, I. H. Colley, J. G. E. Collins, A. L. Cowan, John Davenport, J. L. J. de Bary, P. L. G. G. Delva, R. B. Dittmar, R. G. Donaldson, D. H. Dracup, G. A. Dransfield, D. A. Evans, T. M. W. Farewell, J. M. Fisher, H. A. Friedlander, Kathleen M. Frith, R. G. Gibbs, M. E. Glanvill, Bruno Goldstein, Aileen M. Hampton, P. R. Harben, A. B. Hanward, Annie Hosker, J. A. C. Howie, Aelwen Hughes, L. G. R. Hull, Rosalind E. S. James, Mary J. Jeffery, F. H. W. Johnson, Margaret E. Johnson, Millicent M. Johnston, D. C. B. Jones, H. E. Kane, C. A. L. Kyndt, A. H. Laxton, A. L. Levene, Robert Lewis, Patricia M. M. Lobb, B. C. H. Luker, A. G. McCallum, I. L. MacFarlane, H. E. Madge, A. P. M. Meyer, M. J. Mildren, E. R. Mitchell, J. C. Mitchell, N. D. W. Morrison, J. B. Moser, Margaret G. Oyston, D. J. Parr, G. G. K. H. Parsons, R. A. Payne, D. L. Phillips, J. C. E. Pougher, F. J. Powell, D. M. P. Pullen, F. A. Rainford, Honour C. I. Richardson, C. S. C. Roberts, K. J. Roberts, P. R. McH. Scales, Eric Schofield, Olive Sharpe, B. A. Shelmerdine, J. T. Sherlock, N. K. Shinton, J. F. Skone, F. H. N. Smith, W. T. Smith, Schier Sternberg, Janet M. Stokes, S. N. Stotesbury, W. E. Suffield, P. G. S. Sutton, P. K. Sylvester, Elizabeth K. Tang, Barbara R. Tanner, Hilda J. Tanner, K. C. G. Taylor, Valerie M. Thompson, R. L. Timms, W. C. Turner, Joan C. Wells, W. J. Williams, M. B. Wingate, J. L. Wood, D. H. M. Woollam, M. E. Y. York-Moore.

Diplomas were conferred, jointly with the Royal College of Surgeons, on those named in our issue of Jan. 17 (p. 123) and on the following:

D.C.H.—M. B. Gamat, A. D. M. Jackson.

D.T.M. & H.—Sami Khayatt.

D.P.H.—L. R. B. Birt, Philip Coggin Brown, Jessie A. R. Cripps, T. M. W. D'Arcy, Margaret B. Davies, James Dolan, V. O. B. Gartside, R. B. Illing, C. L. Knight, S. E. Large, Barbara Law, W. C. D. Lovett, J. H. Maughan, A. J. Nelson, John O'Regan, W. S. Parker, Peter Pattison, J. V. Radley, Joseph Reynolds, H. J. A. Richards, A. F. Ritchie, Mary V. Rose, Marguerite S. Sheare, Elspeth W. Smellie, Agnes A. V. Smyth, Walter Stewart, Philip Weyman, D. H. J. Williams.

D.Phys.Med.—W. R. Grant, A. K. Tyler.

D.O.M.S.—John Scully.

D.M.R.—D. K. Sambrook.

D.A.—J. B. Searle.

D.P.M.—D. W. Rowntree.

B.M.A.'s Libel Action

The British Medical Association has issued a writ against the editor and publishers of the *Daily Mirror*, claiming damages for libel and asking for an injunction. The matter complained of includes passages which have recently appeared in the *Daily Mirror* relating to the plebiscite.

Hospital Exhibition

This exhibition, which is to be held at the West Grove Drill Hall, Newport Road, Cardiff, from Feb. 10 to 13, has been organised by the South Wales area committee of the British Electrical Development Association. Its two main sections show how electricity may be used in hospitals for electro-medical apparatus and for domestic and catering equipment.

Royal Microscopical Society

At 6 P.M., on Wednesday, Feb. 18, at B.M.A. House, Tavistock Square, London, W.C.1, Mr. Frank Baker will speak on the Scope and Applications of Direct Microscopy to the Investigation of Starch and Cellulose Breakdown in the Digestive Tract.

British Council

Dr. N. Howard Jones has resigned from the directorship of the medical department of the council and the editorship of the *British Medical Bulletin* on his appointment as chief medical editor to the World Health Organisation (Interim Commission). Dr. Margaret Suttill becomes temporary director of the medical department and Dr. A. Dewar Duff temporary editor of the *Bulletin*.

Dr. J. R. Rees, physician to the Tavistock Clinic and consulting psychiatrist to the Army, is visiting Denmark and Sweden under the auspices of the British Council in connexion with the forthcoming International Congress on Mental Health. Dr. G. L. Brown, director of the physiological department at the National Institute for Medical Research, who is also a member of the council's medical panel, will visit Sweden and Denmark during March to lecture on neuromuscular transmission.

Appointments

BONNIN, J. G., M.B. Melb., F.R.C.S., M.R.C.O.G.: **surgeon, Central Middlesex County Hospital.**

BROWN, F. W., B.A., D.M. Oxfd, M.R.C.P.: **psychiatrist, Hampstead General and North-West London Hospital.**

GUTHKELCH, A. N., M.A., B.M., M.CH. Oxfd, F.R.C.S.: **neurological surgeon, Salford Royal Hospital.**

KREMER, MICHAEL, M.D., B.SC. Lond., F.R.C.P.: asst. physician, National Hospital, Queen Square, London.

LOGAN, W. P. D., M.B. Glasg.: medical statistician, Civil Service Commission.

MULLARD, K. S., M.A., M.B. Camb., F.R.C.S.E.: thoracic surgeon, Hillingdon and Harefield County Hospitals, Middlesex.

PERKINS, A. C. T., M.C., M.D. Lond., D.P.H.: county M.O.H., Middlesex.

Royal Buckinghamshire Hospital, Aylesbury:

BEATON, A. G., M.R.C.S., B.D.S. Lond.: dental surgeon.

CLARKE, G. H. V., M.A. Camb., M.R.C.S.: clinical assistant, dermatological department.

REEVES, BRIAN, F.R.C.S.E.: surgeon to ear, nose, and throat department.

Births, Marriages, and Deaths

BIRTHS

BIRT.—On Jan. 29, at Norwich, the wife of Mr. A. B. Birt, F.R.C.S. —a daughter.

CHALMERS.—On Feb. 2, in London, the wife of Dr. J. N. M. Chalmers —a daughter.

DENT.—On Jan. 27, the wife of Dr. Charles Dent—a son.

LITTLE.—On Jan. 29, at Whitby, the wife of Dr. J. D. Little —a daughter.

PEARSON.—On Jan. 25, at Borrowash, Derby, the wife of Dr. Patrick Pearson—a son.

SLATER.—On Jan. 27, in Manchester, the wife of Dr. H. B. Slater —a son.

WALKER.—On Jan. 21, at Tunbridge Wells, the wife of Dr. A. S. Walker—a daughter.

DEATHS

BARROW.—On Jan. 31, Frederick Barrow, M.R.C.S., aged 95.

CLARKE.—On Jan. 10, at Napier, New Zealand, Edward Clarke, M.D. Brux., M.R.C.S., D.P.H.

FASSON.—On Jan. 25, at Hertford, Robert Robertson Fasson, M.D. Edin., D.P.H., surgeon commander, R.N. retd.

GUINNESS.—On Jan. 29, in London, Ernest Whitmore Guinness, O.B.E., L.R.C.P.I., aged 82.

HOWLEY.—On Jan. 28, at Sunningdale, Henry Edward Howley, lieut.-colonel, R.A.M.C. retd.

LUNHAM.—On Jan. 28, in London, John Lumsden Lunham, lieut.-colonel, I.M.S. retd., aged 69.

REECE.—On Jan. 31, Richard Harold Reece, M.A. Camb., M.R.C.S., L.D.S. R.C.S.

WHITE.—On Jan. 27, Ernest White, M.R.C.S., L.D.S. R.C.S.

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THE PRINCIPLES OF B.C.G. VACCINATION

ARVID J. WALLGREN
Med. Dr. Uppsala
PROFESSOR OF PÆDIATRICS IN THE UNIVERSITY OF STOCKHOLM

EXPERIMENTAL research work and clinical experience have shown that the first tuberculous infection confers an increased resistance against subsequent infections. This resistance is due to specific immunity. There are many clinical observations sustaining the view that the immunity, though only relative, may be of real value to the bearer; it seems to protect him against the immediate danger of new exogenous infections. In addition to the specific immunity there is in man a non-specific natural resistance, the degree of which determines not only the pathological effect of the first infection but also the remote fate of the infected. In the long run the course of tuberculous infection is determined more by non-specific natural resistance than by specific immunity.

The degree of non-specific resistance against tuberculosis is, however, not constant; it varies considerably during life. The resistance against virulent first infections is slight during infancy and increases up to school age, after which it decreases.

We cannot alter the effect of age on non-specific resistance, but we can compensate a missing or low natural resistance by inducing artificial specific immunity in those who are susceptible. This may be conferred by antituberculous vaccination, which, if safe and effective, should reduce the risk of primary tuberculous infection at ages and in persons with low natural resistance.

Though B.C.G. vaccination has been used more than twenty years, its effectiveness is still disputed, and in some quarters it is looked on with great suspicion. There are several reasons for this. The first reports on the prophylactic value of the vaccination were scientifically unreliable; the vaccination was done in such a way that rapid development of immunity seemed improbable; many advocates of the vaccination were too optimistic in their judgment of its value, and their conclusions were open to severe criticism; and some workers do not think a lot of specific immunity in tuberculosis at all.

On the other hand, many sincere, qualified, and objective observers are convinced of the efficacy of a rational B.C.G. vaccination, and in several countries an easily demonstrable satisfactory protection has pushed the method forward, as in Scandinavia.

World opinion is unanimous that B.C.G. bacilli cannot produce progressive tuberculosis in man and that a vaccine prepared from these bacilli may be used without danger. The Lübeck disaster, in which many infants died after having been vaccinated, was due not to the B.C.G. vaccine but to the virulent tubercle bacilli that had been mixed with the B.C.G. bacilli. It is also almost generally agreed that, for antituberculous vaccination to be effective, it must produce tuberculin sensitivity. Though tuberculin sensitivity and specific immunity are entirely different things they usually run parallel, and in vaccination it is considered safe to conclude that no specific immunity is acquired before tuberculin sensitivity is demonstrable.

METHODS OF VACCINATION

At present three different parenteral methods of vaccination are used—intradermal injection, multiple puncture, and scarification. All three, when successful, produce tuberculin sensitivity.

Intradermal injection has been largely used in Scandinavia and has the advantage of being exactly measurable. It has, however, the inconvenience sometimes of producing small local abscesses, which may require a month or two to heal. These complications, though not entirely avoidable, can largely be prevented by a satisfactory technique. The fact that in Sweden each year hundreds of thousands of people voluntarily undergo vaccination shows that these small abscesses are really of very little importance.

Multiple puncture and scarification are easily done, and the local reaction is usually slight; for which reason these methods are preferred in some quarters. Their capacity to produce long-lasting tuberculin sensitivity is, however, perhaps somewhat less than that produced by intradermal vaccination. The immunity conferred by them seems to be as satisfactory as that produced by intradermal vaccination; so though I personally have used only the intradermal method, I will not maintain that this ought to be the method of choice.

TUBERCULIN SENSITIVITY

Tuberculin sensitivity after B.C.G. vaccination is most important as a sign of existing specific immunity. In practice we have to act as if there is no immunity before tuberculin sensitivity develops, and as if the immunity is lost when tuberculin sensitivity disappears in a vaccinated person. I emphasise this because there is a growing tendency to depreciate its importance, with disastrous consequences for the vaccinated and misjudgment of the effectiveness of vaccination. We must bear in mind that B.C.G. vaccination does not merely consist in application of the vaccine in a satisfactory way, but it also includes subsequent tuberculin control of the vaccinated and their protection from virulent infections until tuberculin sensitivity is demonstrable. Generally the incubation period of the B.C.G. bacilli is 6–8 weeks; in young infants it is often 8–12 weeks.

The importance of tuberculin control and protection from infection is illustrated by the investigation of Levine and Sackett (1946), who found identical mortality-rates in the vaccinated and unvaccinated groups. They had injected B.C.G. vaccine into 8 infants who were exposed to virulent infection at home before and immediately after the vaccination. Only the merest fluke could have saved these children from being infected before they had acquired any immunity from the vaccination, and in fact all of them died of tuberculosis. These children cannot, of course, be considered adequately vaccinated, though they got an injection of the vaccine.

There is no use in vaccinating anybody who is already tuberculin-positive after virulent infection. A tuberculin test should therefore have proved negative before the vaccine is given. Even so, a virulent infection may possibly have been acquired within the last six weeks, and vaccination may thus be performed during the incubation period of the infection. Accordingly, when it is known that a tuberculin-negative child has been exposed to infection, the vaccination should be postponed until at least six weeks have elapsed since the exposure, and should be done then only if the tuberculin test is still negative. Experience has shown that there is no danger in vaccinating an already infected child, but it should be avoided to prevent misinterpretation of the value of the vaccination.

Tuberculin sensitivity produced by virulent infection may sometimes gradually disappear; tuberculin sensitivity produced by B.C.G. vaccination disappears much more often and rapidly. It is impossible to foretell how long the tuberculin sensitivity may last in any given case of B.C.G. vaccination, since its duration varies greatly. Sometimes the tuberculin test becomes negative in a couple of years or less; sometimes it remains positive for ten years or more. The longer the tuberculin sensitivity lasts, the more probable it is that a subclinical virulent infection has been acquired and has transformed the artificial tuberculin sensitivity and slight immunity into a quasi-permanent tuberculin sensitivity and immunity. In such cases the B.C.G. vaccination has

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fulfilled its object, increasing resistance to such a degree that the first tuberculous infection is well tolerated without the development of evident clinical tuberculosis. There is no reliable way of differentiating between tuberculin sensitivity produced by B.C.G. vaccination alone and that produced by additional virulent infection. Tuberculin sensitivity produced by B.C.G. vaccination is, however, generally slighter and often requires 1 mg. of tuberculin to cause a positive reaction.

Though some degree of immunity may remain in B.C.G.-vaccinated persons whose tuberculin sensitivity has disappeared, it is inadvisable to presume immunity in such cases. It is safer to conclude that the immunity has disappeared concomitantly with tuberculin sensitivity, and to repeat the vaccination. In revaccination it often happens that the local reaction and tuberculin sensitivity appear more rapidly than at the first vaccination—a sign of subclinical lasting allergy.

From what has been said it follows that the manifestation of clinical primary tuberculosis in a B.C.G.-vaccinated child is not always proof that the vaccination has been of no value in that particular case. The vaccination may have been performed during the incubation period of a virulent infection; or a virulent infection may have been acquired either during the incubation period of the B.C.G. bacilli or some years after vaccination, when the transient immunity had disappeared. In such cases the infected children have not had time to acquire any specific immunity, or the immunity has already become extinct. Occasionally, however, we see a case of primary tuberculosis which undoubtedly has manifested itself in a child with B.C.G. immunity. This is not remarkable, because the artificial immunity produced by B.C.G. only affords a relative protection. It is more remarkable that these cases of primary tuberculosis in B.C.G.-immune persons are almost always very mild, even in infants, and that they do not occur more often.

FOLLOW-UP STUDIES

The attempts made to assess the protective effect of B.C.G. vaccination by systematic follow-up studies are of greater interest than the reports of solitary instances of tuberculosis after B.C.G. vaccination. For these studies to be conclusive, the vaccination must be properly performed and the following three criteria, at least, should be fulfilled: (1) there must be a contemporary unvaccinated control group of the same sex, age, and standard of living as the vaccinated group; (2) the risk of exposure to virulent infection must be equal in the two groups; and (3) the number of cases in each group should be large enough for statistical analysis and to allow for variation in individual natural resistance. Most of the published studies of the fate of vaccinated and unvaccinated persons are inadequate in that they do not comply with these criteria and are thus open to criticism.

In Sweden it is at present impossible to form two identical groups of tuberculin-negative persons and, without any selection, vaccinate only one of them. Personal experience has led Swedish physicians to believe in the protective value of B.C.G. vaccination, and none of them would deliberately leave a large group of tuberculin-negative persons without this protection just to test the reliability of the method of vaccination. The dangers of primary infection in tuberculin-negative unvaccinated persons are too obvious. We must leave such tests to colleagues in countries where B.C.G. vaccination is not prevalent and is looked on with suspicion.

There are, however, a few studies on the effectiveness of B.C.G. vaccination which seem to comply with the criteria just mentioned. I will cite three of the most recent.

Hyge (1947) has described an interesting epidemic of tuberculosis in a Scandinavian school for girls aged 12–18 years. Before exposure to infection 105 pupils were tuberculin-positive, 106 had been B.C.G.-vaccinated, and 94 were tuberculin-negative. The exposure lasted two months. Of the 105 tuberculin-positive girls only 2 fell ill, with mild pulmonary tuberculosis; of the 106 B.C.G.-vaccinated girls 2 acquired pulmonary tuberculosis; but of the 94 tuberculin-negative girls 41 acquired tuberculosis. The morbidity-rates in the three groups were 1·9%, 1·9%, and 43·6% respectively.

In U.S.A. in 1935–38 Aronson and Palmer (1946) vaccinated 1550 tuberculin-negative Indians, aged 1–20 years, living in reservations or in Indian communities in Alaska. As a control group they injected salt solution in 1457 tuberculin-negative Indians from the same places and of the same ages. Annual follow-up examinations showed that the two groups were exposed to virulent infection to the same extent. Deaths from tuberculosis numbered 4 among the vaccinated Indians and 28 among the unvaccinated; minimal tuberculosis developed in 8 and 20 cases respectively, moderately or advanced pulmonary and extrapulmonary tuberculosis in 9 and 48, pleural effusion in 4 and 18, enlarged hilar glands in 19 and 99, and parenchymal lesions in 11 and 74. The total incidence of tuberculosis was 40 in the vaccinated group and 185 in the unvaccinated.

Ferguson (1946), of Saskatchewan, reported the incidence of tuberculosis among nurses and sanatorium employees in 1934–43. Of 1005 B.C.G.-vaccinated nurses in general hospitals, 9 (0·9%) acquired tuberculosis, whereas of 759 unvaccinated tuberculin-negative nurses 29 (3·8%) acquired tuberculosis—i.e., about four times as many. This difference between the two groups is also pronounced among graduate nurses and nurse assistants in sanatoria: of 203 vaccinated 5 (2·7%) acquired tuberculosis, whereas of 113 unvaccinated 18 (15·9%) did so. Ferguson concludes: "The serious situation that had been developing with regard to excessive incidence of tuberculosis among nurses and sanatoria employees who did not react to tuberculin on entering the environment, during the period 1930 to 1938, has not been present since vaccination of negative reactors was begun in September, 1938. The nursing schools and the League in Saskatchewan no longer have anxiety and worry with regard to excessive tuberculosis developing among their negatively reacting staff."

CONCLUSIONS

In no follow-up study so far reported has adequate B.C.G. vaccination been ineffective as judged by experience of an unvaccinated tuberculin-negative group. Even Levine and Sackett (1946), who seem to underrate the value of B.C.G. vaccination, have found that, if immunity has time to develop before exposure to tuberculosis, the death-rate is about three times higher in the unvaccinated group. B.C.G. vaccination performed in the manner here described has without doubt proved its protective value, and merits the growing interest and confidence put in it by many physicians all over the world.

On the other hand, one should not exaggerate the effectiveness of B.C.G. vaccination. At best it may protect against the immediate consequences of virulent infection and diminish the incidence of primary and early postprimary tuberculosis. In my opinion there is no evident prophylactic influence on the development of *late* manifestations of postprimary tuberculosis—e.g., bone and joint tuberculosis, genito-urinary tuberculosis, and late tertiary pulmonary tuberculosis. Specific immunity seems to play a more insignificant part in the resistance against these types of tuberculosis. Now tuberculosis in childhood is principally primary tuberculosis, which may be prevented by satisfactory artificial immunity, and this is why B.C.G vaccination is especially of pædiatric interest.

The beneficial effect of B.C.G. vaccination is also, however, increasingly apparent in Scandinavia at ages above childhood. For example, the infection-rate at 15 years of age is now only about 30–50% of what it was forty years ago. In most countries the majority of the population become infected shortly after childhood, in puberty and adolescence, at a time when natural non-specific resistance against tuberculosis decreases. B.C.G. vaccination, however, should have the same protective

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value at this age as in the susceptible ages of childhood, and the vaccine should prevent manifest primary and early postprimary pulmonary tuberculosis at this age.

So long as there is no reliable method of eradicating virulent tuberculous infection for ever, which would be the most effective measure, antituberculous vaccination should be used to increase the resistance in susceptible people. Until we possess a more efficient prophylactic method B.C.G. vaccination is likely to keep its place in the campaign against tuberculosis in countries where it has been used. To colleagues who still hesitate to use it I plead: "Give B.C.G. vaccination a fair trial, and you will be convinced of its effectiveness."

SUMMARY

To be adequate, B.C.G. vaccination must not consist solely in vaccination; the vaccinated persons must be repeatedly tuberculin-tested and protected against exposure to infection by tubercle bacilli until they become tuberculin-positive.

Nothing is gained by B.C.G.-vaccinating tuberculin-positive persons, and before B.C.G. vaccination the person should be proved to be tuberculin-negative. Even so, he may be in the incubation stage of an infection with tuberculosis.

Where a person is known to have been recently exposed to tuberculosis B.C.G. vaccination should be postponed until at least six weeks after the date of exposure, and should then be done only if the tuberculin test is still negative. (There is no danger in B.C.G.-vaccinating persons already infected, but it confuses the interpretation of results.)

The duration of tuberculin sensitivity produced by B.C.G. is very variable—from less than two years to more than ten. The longer it lasts, the more likely is it that a subclinical infection with tuberculosis has been acquired.

Development of tuberculosis in a B.C.G.-vaccinated child does not mean that B.C.G. vaccination has been useless in that particular case. The immunity conferred by B.C.G. is only relative.

There is no reliable way of distinguishing between tuberculin sensitivity due to B.C.G. and that due to infection.

In practice immunity is held to last as long as the tuberculin-test is positive. If a tuberculin-positive person becomes tuberculin-negative he should be revaccinated with B.C.G.

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"... Deprived ... of the possibilities of scientific diagnosis the practitioner has become a most highly skilled craftsman in the relief of the social disabilities associated with disease—*which is what his patients demand of him.* But it is very clear that what the public demands and gets from the practitioner is not what the State, the friendly societies and the industrialists expect of the doctor.

"The medical student secures his qualifications and training from specialists, for specialism; is driven into practice after failing to find something better; attempts in general practice to live up to his high training; suffers his disillusionment; which is retrieved if he discovers this new and unexpected outlet for his energies—*the maintenance of social capacity.* It seems to take some years before the practitioner rises above the training in specialism which he was given as a student and acquires this new attitude towards disease. The patients are so well aware of this doctors' dilemma that all too often they use their 'panel' doctor, their 'private' doctor or the hospital simultaneously to secure relief from the different aspects of their disabilities."—*Biologists in Search of Material*, edited by Dr. G. SCOTT WILLIAMSON and Dr. I. H. PEARSE. (Interim Report on the Work of the Pioneer Health Centre, Peckham.) London, 1947.

TREATMENT OF NUTRITIONAL MACROCYTIC ANÆMIA WITH SYNTHETIC FOLIC ACID*

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THE pathogenesis of nutritional macrocytic anæmia is far from clear. However, two important advances have been reported recently from our clinics (Spies 1947, Frommeyer and Spies 1947). The first of these was the discovery that pteroylglutamic acid (folic acid) produced a prompt hæmopoietic response in persons with nutritional macrocytic anæmia. The second was that 5-methyluracil (thymine), an entirely different chemical substance, when given in several thousand times the dose of folic acid produced a similar response in persons with this disease. We are continuing the studies of the natural occurrence of anæmia associated with pellagra and other vitamin-B-complex deficiency diseases, and the present report is concerned primarily with the treatment and rehabilitation of persons with nutritional macrocytic anæmia by means of folic acid.

Of the 97 consecutive patients admitted with severe macrocytic anæmia and studied in the nutrition clinic of the Hillman Hospital, Birmingham, Alabama, and the Calixto Garcia Hospital, Havana, Cuba, 32 with nutritional macrocytic anæmia were selected for this special study, the diagnostic points being as set out in the accompanying table. They were aged 35–70; all of them were white; 9 of them were women, none of whom were pregnant.

In the arbitrary selection of these patients the following criteria also were used: (1) the red cells must be fewer than 3,000,000 per c.mm.; (2) the bone-marrow must show the typical erythroblastic arrest; (3) repeated gastric analyses must show free hydrochloric acid in the gastric contents; (4) no treatment whatever, or no treatment given recently enough to interfere with the evaluation of the anti-anæmic preparation, must have been received; and (5) the icteric index must be normal.

METHOD AND MATERIAL

Rigid dietary control was instituted on admission to hospital and maintained throughout the stay in hospital. Meat, meat products, poultry, and fish were not permitted. Complete medical and dietary histories were obtained, and complete medical and neurological examinations were performed frequently throughout the course of the study. Detailed histories † showed that the diets of these patients had been grossly deficient in protein and the B-complex vitamins for many years.

* Northwestern University, Department of Metabolism and Nutrition, studies in nutrition at the Hillman Hospital, Birmingham, Alabama, and at the Calixto Garcia Hospital, Havana, Cuba.
† Obtained by Miss Jean Grant, Mrs. Myrtle Neblett, and Mrs. Dorcas White.

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Daily hæmatological examinations included white-cell and red-cell counts, hæmoglobin determinations, and reticulocyte-counts. For both the white-cell and red-cell counts certified Trenner pipettes were used. The Hb content of the blood was determined with an Evelyn or a Leitz colorimeter. The reticulocytes were counted in wet preparations by using a modified brilliant cresyl blue solution of Dameshek. Cell volumes were determined from time to time on oxalated venous blood with Wintrobe hæmatocrit tubes. Before treatment bone-marrow was obtained in each case by sternal aspiration. Differential counts were made on preparations stained with both supravital and Wright-Giemsa stains. Examination of the bone-marrow showed that it was cytologically indistinguishable from that found in persons with Addisonian pernicious anæmia in relapse.

Analyses of the gastric secretions ‡ were repeated every six to twelve months. A complete gastro-intestinal series was done on admission to hospital. Radiography after a barium enema was done in each case. Stool specimens from each patient were examined for occult blood, ova, pathogenic bacteria, and parasites. Serum-protein determinations were made in each case.

All the patients had lost a considerable amount of weight since the onset of their illness. They all complained of being weak and of constant fatigue. Usually they lay quietly in bed and seemed to have no desire to move. All of them had lost their appetites, and many had an actual distaste for food. In all the cases diarrhœa had been present for from one to three months and varied in severity from case to case. Pain, burning, and sensitivity of the tongue and mouth, and epigastric distress were common complaints. Burning of the soles of the feet and cramping of the leg muscles likewise were common complaints, and many of the patients had paræsthesias and hypoæsthesias of a type which can often be relieved with thiamine. Œdema, possibly associated with a reduction in serum-albumin, was present in 9 cases, pellagra in 9, riboflavine deficiency in 11, thiamine deficiency in 7, and scurvy in 2. (Most cases with clinical evidence of one vitamin deficiency had evidence of several deficiencies operating at the same time.) Dyspnœa was present in 24 cases. In every case the blood-pressure was normal or low, and in no instance was the pulse-rate raised. None of the patients had fever or any evidence of infection.

After base-line determinations were completed, the patients were given folic acid 5–50 mg. by mouth daily; 21 were given 10 mg. daily.

RESPONSE

After treatment with folic acid the reticulocytosis and the increase in hæmoglobin and red cells indicated a satisfactory response in every case. Coincident with the hæmopoietic response the patients showed great subjective improvement. They said they felt stronger than they had for years. All of them improved and were discharged from hospital. Follow-up studies of all the cases for eighteen months and of some for twenty-four months have shown that none of them has had a severe relapse, though all but 4 still eat a somewhat inadequate diet. The response was so nearly the same in all the cases that we consider the best and most concise way to present the pertinent data is to give the following representative case-record.

A white Cuban man, aged 44, was admitted to the Calixto Garcia Hospital complaining of extreme weakness, swelling of the ankles, diarrhœa, and loss of weight. Nothing relevant in past history and family history.

Except for childhood diseases, and malaria when he was 24, he had always been well. He had worked hard every day as a carpenter, and his appetite had been good. His usual diet had consisted of large amounts of viandas (root vegetables grown in Cuba), dried beans, rice, cornmeal, bread, and liberal amounts of sugar and fats. As a rule he had drunk one or two glasses of milk daily with coffee. He had disliked eggs and had rarely eaten them. Almost daily he had eaten fat pork but had rarely eaten even a small helping of lean meat. He had disliked and never eaten green vegetables of any kind. Three months before admission he had begun to have two loose stools daily. Gradually the diarrhœa had become more severe, and within three weeks he had begun to have five or six semi-solid brown stools daily. About this time he had lost his appetite and developed such a profound distaste for food that he had had to force himself to take a little soup made with viandas, rice, milk, and coffee daily. Soon he had begun to have severe epigastric distress and his tongue had become so sore that it was difficult for him to eat even these foods. A month after the onset of his illness he had become too weak to continue working and had spent most of the time in bed. He had not been able any longer to afford milk; so his diet had consisted entirely of small amounts of vianda soup, polished rice, and coffee. As his weakness had increased, he had noted that he was becoming paler and that his tongue was very red. A week before admission his ankles had begun to swell. This, and the fact that he had lost 25 lb. in weight in three months, had alarmed him and made him seek treatment.

On examination he was well developed but considerably undernourished, very pale, and extremely weak. He seemed to have great difficulty in walking because of weakness and swelling of ankles. Buccal mucosa, conjunctivæ, and nail beds strikingly pale. Along border and at tip of tongue were many red hypertrophic papillæ. Skin in general pale, with areas of pigmentation on elbows, forearms, dorsum of hands and feet, and ankles. Neurological examination negative.

Laboratory Findings.—Gastric analysis showed free hydrochloric acid in fasting gastric secretion. Stool and gastro-intestinal cultures negative for pathogens. Barium-enema radiography negative. Glucose-tolerance test, after glucose 40 g. by mouth, showed: fasting 90·9 mg., 30 min. 95·2 mg., and 90 min. 86·9 mg. per 100 ml. Serum-protein 5 g., serum-

‡ Made by Miss Monette Springer, Miss Alice Rogers, Miss Frances Prudish, and Dr. Aureliano Rodriguez.

DIFFERENTIAL DIAGNOSIS OF SOME MACROCYTIC ANÆMIAS IN RELAPSE

Clinical and laboratory features	Pernicious anæmia	Nutritional macrocytic anæmias	Sprue	Chronic liver disease	Pernicious anæmia of pregnancy	Achrestic anæmia
Dietary deficiency in animal protein	Rarely present	Always present	Often present	Rarely present	Often present	Absent
Glossitis	Often present	Often present	Often present	Rarely present	Often present	Rarely present
Diarrhœa	Often present, alternating with constipation	Usually present	Nearly always present (fatty or soapy)	Rarely present	Rarely present	Rarely present
History or signs of pellagra, beriberi, or riboflavine deficiency	Rarely present	Often present	Less often present	Rarely present	Often present	Absent
Posterior lateral column degeneration	Often present	Rarely present	Rarely present	Absent	Absent	Absent
Macrocytic anæmia	Severe	Severe	Severe	Mild	Moderate to severe	Moderate to severe
Anisocytosis and poikilocytosis	Pronounced	Pronounced	Pronounced	Mild	Pronounced	Pronounced
Megaloblastic bone-marrow	Present	Present	Present	Present	Present	Present
Free gastric HCl after histamine	Absent	Usually present	Usually present	Usually present	Usually present	Present
Intrinsic factor in gastric juice	Absent	Present	Present	Present	Present	Present
Response to intramuscular liver extract	Excellent	Excellent	Good	Fair	Excellent	Absent
Response to oral beef or beef extracts	Poor	Excellent	Fair (anæmia)	Poor	Probably good	Absent
Response to folic acid	Excellent	Excellent	Excellent	Sometimes	Excellent	Not determined
Need for continuous specific therapy	Always	Rarely	Sometimes	Rarely	Rarely	—

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albumin 2·2 g., serum-globulin 2·4 g., and serum-fibrinogen 400 mg. per 100 ml. Red cells 980,000 per c.mm., Hb 3·8 g. per 100 ml., reticulocytes 2·1%. Subsequent examinations agreed closely. Bone-marrow showed megaloblastic arrest.

Treatment.—After base-line studies had been completed, the patient was given folic acid 10 mg. daily by mouth. During five days in hospital before start of therapy he seldom got out of bed, rarely spoke, and never read. His food intake during this time averaged 1000 calories daily, and it was only with persuasion that he took this amount.

Two days after start of therapy he volunteered that he felt different and stronger than he had for many weeks. He ate most of the food offered.

On third day of therapy he sat up in bed, read newspaper during morning, and in afternoon walked slowly to another part of ward to visit a patient. At supper he asked for extra helpings. By now soreness and burning of tongue had decreased and it was less red, and there was much less epigastric distress. On sixth day of therapy reticulocytes reached a peak of 33·2%. Patient gained strength rapidly, and at the end of two weeks' therapy asked to go home. By now red cells had increased to 2,920,000 per c.mm. and Hb to 7·9 g. per 100 ml., and reticulocytes had fallen to 3·9%. Diarrhœa gradually subsided, and by end of third week of therapy stools were normal; tongue normal in colour, and pigmented areas on skin had almost disappeared. Œdema of ankles subsided gradually, as did pigmented areas on skin, and by end of seventh week they had disappeared.

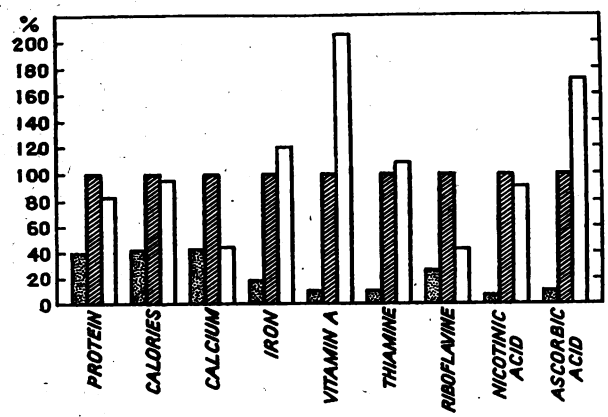

Fig. 1—Nutrients supplied by diet of patient with mixed deficiency diseases compared with recommended allowances: hatched columns, allowance recommended by National Research Council committee on foods and nutrition; stippled columns, nutrients in patient's diet before treatment; blank columns, nutrients in patient's diet after treatment.

On discharge from hospital after seventy-six days' folic-acid therapy, patient had gained 25 lb. in weight. Blood-count: red cells 4,620,000 per c.mm., Hb 15·2 g. per 100 ml., reticulocytes 0·8%. Patient was instructed to eat foods which would provide a high-caloric, high-vitamin, and high-protein diet. The day after he was discharged he resumed work as a carpenter.

Follow-up.—For the past eighteen months he has remained in excellent health and has not missed a day's work (he works fourteen hours a day). His diet (fig. 1), though not completely satisfactory as regards amount of green vegetables or caloric value in relation to energy expended, provides adequate amounts of meat, milk, and eggs. He has had no recurrence of symptoms and says he feels strong and perfectly well. On his last visit a blood-count showed red cells 5,430,000 per c.mm., Hb 14·4 g. per 100 ml., and reticulocytes 0·6%. Patient weighs 5 lb. less than on discharge, probably because caloric intake is not enough for work done.

Hæmopoietic response and weight changes throughout therapy and for eighteen months after are shown in fig. 2.

COMMENTS

For this study 32 persons with nutritional macrocytic anæmia were selected. They all complained of weakness, pallor, and glossitis, and most of them had, or had had, clinical evidence of pellagra, riboflavine deficiency, beriberi, or scurvy. In each case the red cells were fewer than 3,000,000 per c.mm. None of the patients had

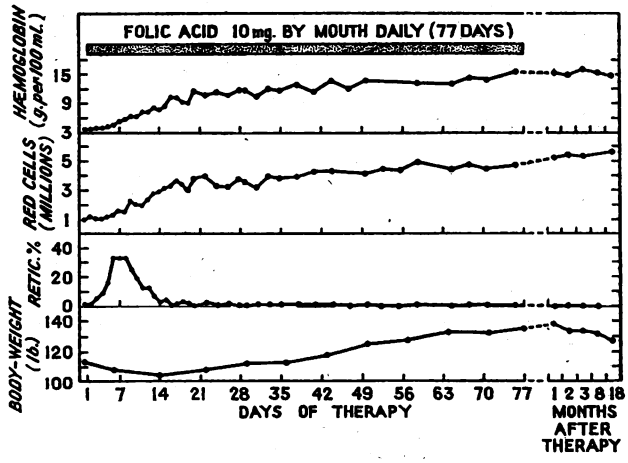

Fig. 2—Hæmopoietic and weight response of patient with tropical sprue during and for eighteen months after folic-acid therapy.

combined system disease, and no physical or laboratory evidence of hæmolysis was present. (Patients with nutritional macrocytic anæmia occasionally have jaundice.) The peripheral blood and bone-marrow were indistinguishable from those seen in Addisonian pernicious anæmia in relapse. Free hydrochloric acid was found in the gastric contents of all of the patients. (Occasionally persons with nutritional macrocytic anæmia have no free hydrochloric acid.) In the selection of these patients we gained the impression that nutritional macrocytic anæmia is more common in regions of the world where deficiency diseases are endemic than has been realised heretofore.

Though the patients were restricted to a diet which included no meat, meat products, fish, or poultry (a diet which is not recommended in the treatment of anæmia or nutritional deficiency disease), they all gave a prompt hæmopoietic response to folic acid by mouth. Coincident with the hæmopoietic response there was a great improvement in appetite, and the gain in weight was, in many instances, dramatic, as can be seen in fig. 2. All the patients gained sufficient strength to return to their homes, and most of them to return to work.

It is worthy of emphasis that, in contrast to persons with Addisonian pernicious anæmia who so often develop combined system disease (Spies and Stone 1947, Vilter et al. 1947), these patients with nutritional macrocytic anæmia did not develop any evidence of this disease during the eighteen months to two years they have been under observation.

SUMMARY

Folic acid produced a satisfactory clinical and hæmopoietic response in each of 32 cases of nutritional macrocytic anæmia in relapse. The blood-levels were maintained for eighteen to twenty-four months with no other specific therapy.

There was no evidence of the development of subacute combined degeneration in any of these patients, which is in contrast to the usual experience with Addisonian pernicious anæmia.

This study was aided by grants from the Lederle Laboratories Inc., and from the Martha Leland Sherwin Fund. The synthetic pteroylglutamic acid (folic acid) was provided by Lederle Laboratories Inc. Valuable technical assistance was given by Mrs. Mary B. Koch, Miss Belle Culver, Miss Helen M. Grant, and Mrs. Raimundo Llanio Navarro.

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CLASSIFICATION OF PERIPHERAL-NERVE INJURIES

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IT has been suggested that injuries to peripheral nerves may be divided into three classes: (1) transient or non-degenerative lesions (neurapraxia), in which, if complicating factors are absent, excellent recovery will take place; (2) complete division of nerve-fibres and sheath (neurotmesis), in which recovery cannot take place unless the divided ends are brought into apposition after removal of intervening scar tissue; (3) degenerative lesions in continuity (axonotmesis), in which good spontaneous recovery by regeneration may be expected but only slowly (Seddon 1942). Many different mixtures and combinations of these three pathological processes might occur in the same nerve trunk; but since a classification, besides being accurate, must be of practical value, it is unwise to make it too complex. The aim of the clinician is to try to determine, at the earliest possible date, what proportion of nerve-fibres in an injured nerve are likely to make a spontaneous recovery. The success of any classification must be judged largely on whether it helps him to do this.

There are at least three further clinical entities which require attention: (4) partial division of a nerve; (5) continued compression; and (6) traction lesions. Categories 1 and 2 explain themselves and do not require further consideration; but categories 3, 4, 5, and 6 present certain similarities.

It is often assumed that any nerve lesion which makes a spontaneous but slow recovery is a case of axonotmesis. Indeed, this condition is said to be characterised by slow spontaneous recovery—ultimately usually of a high grade. On the assumption that wallerian degeneration takes place in these cases, followed by the down-growth of axones, the rates of axonal regeneration have been calculated (Seddon et al. 1943). It must, however, be realised that, though this condition of a degenerative lesion in continuity may be produced experimentally, there is no proof that it is present in all, or even most, cases of delayed spontaneous recovery, and there is considerable evidence that it is comparatively rare.

There are many links in the complex chain connecting the cerebral cortex with the peripheral end-organ—motor or sensory. Failure or delay may occur at many different levels, and delay in recovery may be due to a "block" in the cerebrum, in the spinal cord, at the site of injury, at the neuromuscular junction, or in the muscle-fibre. Further, voluntary movement depends on an intact proprioceptive mechanism. I believe that the lag in delayed spontaneous recovery is mainly due to these factors, not to the time taken for axones to regenerate, and that, apart from traction lesions and continued compression, axonotmesis is comparatively rare. The following observations support this belief.

OBSERVATIONS

1. In transient lesions such as "Saturday-night paralysis" there is often considerable delay before recovery begins. This time is, however, too short for a degenerative lesion to have developed; so the delay in recovery must be due to one of the other factors mentioned.

2. In transient lesions the proximal muscles usually recover first. Hence the fact that in delayed spontaneous recovery the proximal muscles recover first is no argument in favour of degeneration and axonal outgrowth.

3. In many cases where the pattern of motor recovery is consistent with axonotmesis there is considerable distal sensory recovery before the proximal muscles recover, showing that certain sensory fibres, at any rate, had not undergone degeneration.

4. In other cases, after a period of delay consistent with axonotmesis, various muscles whose motor points are at different distances from the site of injury come into action, almost at the same time, suggesting that the delay was due to factors other than axonal outgrowth.

5. The possibility of a continued "block" at the site of the lesion but without degeneration is illustrated by the occasional case which shows dramatic improvement after neurolysis or removal of a splint or plaster.

6. The importance of the condition of the muscles and the kinæsthetic impulses derived from them is well illustrated by those cases where, after suture of the musculospiral nerve, there is no recovery at 12–15 months and a tendon transplant is done, and shortly afterwards all the muscles regain voluntary movement. Similarly, after correction of an equinus deformity the dorsiflexors of the foot often recover; and, vice versa, the over-hasty removal of a splint often causes voluntary power to regress or disappear in a recovering muscle.

7. The more attention one gives to the condition of the muscles, to encouraging early movement, and getting the patient's coöperation, the fewer cases of delayed recovery are seen.

The records at Winwick E.M.S. Hospital show far fewer cases of delayed spontaneous recovery in the later part of the recent war than in the earlier part. This improvement I attribute to the excellent work done by the various peripheral-nerve surgeons overseas. The number of cases in which the diagnosis of axonotmesis might be applicable is almost in inverse proportion to the efficiency of treatment.

8. In some cases of delayed recovery the delay is far greater than could be explained by the major part of the delay being due to axonal outgrowth (the same applies to some cases of delayed recovery after nerve suture). Though the rate of axonal outgrowth is by no means settled, yet, judging from the results of successful nerve sutures, the first unequivocal signs of recovery are often surprisingly early. Thus, after suture of a median or ulnar nerve at the wrist, some return of sensation to the tip of the index or the little finger is often present at eight or nine weeks. Experimentally, rates as fast as 4 mm. a day have been recorded (Gutmann et al. 1942). It is probable that different fibres grow and mature at different rates, but it is hard to believe that the major part of the delay in these very slow recoveries is due to the time needed for axones to regenerate.

9. It is comparatively difficult to produce a complete state of pure axonotmesis by a single mechanical injury alone. It is only too easy to crush a nerve for relief of pain and find that pain and hypersensitivity reappear in the affected area in a very short time, indicating that a fair proportion of sensory fibres have not undergone degeneration.

From this it appears unlikely that the passage of a missile near the nerve which did not actually touch the nerve would be likely to produce a degenerative lesion. Some fibres may be more sensitive than others and may therefore undergo wallerian degeneration (partial axonotmesis), but this does not affect the main argument, since the non-degenerated fibres should present unequivocal evidence of recovery reasonably early.

Of course continued compression is a different matter and may produce wallerian degeneration, and I believe that either continued compression or a traction lesion is usually present in undoubted cases of axonotmesis.

10. The external popliteal nerve is probably the nerve in which axonotmesis is most commonly diagnosed. The delay before spontaneous motor recovery takes

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place is often fairly long, but the following points should be borne in mind:

(*a*) Some of these lesions are traction lesions, which must be considered in a special category (I think it is agreed that peripheral degeneration often accompanies a traction lesion); the prognosis as regards spontaneous recovery depends on the amount of damage to the nerve-sheaths.

(*b*) In other cases there is continuous compression from a splint, bandage, or plaster, especially in certain treatments of fracture of the femur, and a coexisting foot-drop is, in my opinion, usually an indication for skeletal traction and suspension of the limb.

(*c*) After suture sensory recovery usually precedes motor recovery, and with high sutures motor recovery is notoriously poor, suggesting that there is some special factor at work in this nerve. Another interesting point in this connexion is that, if either the inverters or everters recover first and acquire dominance, the recovery of the opponents is inhibited. Though the peronei usually recover first, in some cases the tibialis anterior recovers first, in which case the peronei may recover only slowly or not at all.

All these facts point to there being other factors far more important than axonal regeneration in causing the delay before voluntary power returns, and it is therefore unjustifiable to label these cases of delayed recovery as axonotmesis, especially as sensory recovery is often early.

DISCUSSION

If it be accepted that axonotmesis is comparatively rare, the management of peripheral-nerve injuries becomes considerably simpler. If all causes of continued compression have been removed; if there are no important complicating factors, such as ischæmia and sepsis; if the peripheral end-organs are in good condition; and if the patient is coöperating in his own re-education, a nerve which shows no evidence of recovery after three or four months has probably been divided (completely or partially) and requires surgical intervention. If there is a complete division with end-bulbs, the course of action is obvious. If there is a neuroma but apparent continuity, I have found the best guide to be the size of the neuroma as indicating the proportion of severed nerve-fibres. My records show that I have more often left a neuroma which should have been resected than done an unnecessary or harmful resection. In doubtful cases I think it justifiable to make a partial incision into the neuroma to see how many bundles are intact. It is often surprising how few can be seen.

CONCLUSIONS

The concept of axonotmesis may be dangerous, in so far as the term is often applied to cover a multiplicity of states and lesions in which spontaneous recovery is by no means certain. This may lead either to unnecessary delay in surgical treatment or to neglect of other therapeutic measures. There are grounds for believing that most cases diagnosed as degenerative lesions in continuity are either non-degenerative lesions in which the delay in recovery is due to other factors, or partial lesions in which a varying proportion of fibres have been permanently damaged. If this proportion exceeds 50%, it is usually wise to perform a resection and suture.

A classification must be helpful as well as accurate; a single nerve-fibre is at any one moment either capable or incapable of conducting impulses. If incapable, it is in one of three conditions: (1) able to recover spontaneously without interference; (2) unable to recover spontaneously owing to solution of continuity and intervening scar tissue; or (3) subject to external pressure. (If the compressing agent is removed early, the nerve-fibre is usually able to recover, but at a later stage it may have suffered irreparable damage.)

In a nerve trunk, which is the unit with which the clinician deals, there are many different fibres, and their resistance to trauma varies. Therefore innumerable different syndromes may develop, at any rate in theory. In practice I have found that nerve injuries fall into four classes:

(1) Complete section—i.e., solution of continuity and separation of the proximal and distal portions to such a degree that spontaneous recovery cannot occur.
(2) Partial section.
(3) Transient lesions—i.e., the nerve has suffered temporary "concussion" and can recover spontaneously.
(4) The nerve is being subjected to continued compression which, if left untreated, will inhibit recovery and may ultimately lead to "section." "Neural compression" is suggested as a convenient short name for this syndrome.

I have not given a special category to traction lesions. To do so would produce a mixed classification based partly on the mechanism of injury and partly on the condition of the nerve. Traction injuries may produce any of the four conditions mentioned, and so may any of the other causal agents—e.g., stab wounds, bullet wounds, cervical ribs, fracture, or cubitus valgus.

In the early stages it may be hard to assign a peripheral-nerve lesion to its proper class except on grounds of probability, such as that "Saturday-night paralysis" is usually transient, and that cuts with glass are usually complete or partial sections.

At the end of three to four months' efficient treatment a nerve which has not recovered should be considered to be in one of the last three categories and should be explored so that the appropriate treatment can be given.

I wish to thank Sir Harry Platt for his advice and help and Prof. H. J. Seddon for valuable criticisms.

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TREATMENT OF AMŒBIC DYSENTERY

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THE high incidence of amœbic dysentery and its poor response to treatment led G.H.Q. (India) to initiate an investigation which occupied the greater part of 1945 and is described below. Its object was to evaluate the widely different courses of treatment in use throughout India Command and if possible to standardise them.

Amœbic dysentery was one of the major medical problems of the war years in the East. In South-East Asia Command the diarrhœal diseases were responsible for a sickness-rate of 100 per 1000 men (Marriott 1945), and in one area about 36% of the diarrhœa cases had amœbic dysentery (Hill 1946). In India Command 543 patients were recommended for evacuation in 1945 alone because of intractable amœbic dysentery (Cameron 1946).

Not only was the incidence of amœbic infection double that of the average pre-war rate, but the response to treatment was poor. No accurate follow-up of treated cases had been possible under war-time conditions, but one of us (A. W. W.) found that 45% of 180 cases treated in 1944 had relapsed within six months, and Leishman and Kelsall (1944) found that 45% of their cases had had a previous attack. This was the common experience of those who treated the disease in India in war-time, and it differed widely from that of Manson-Bahr (1941), whose relapse-rate was only 3·7% after a combined course of emetine bismuth iodide (E.B.I.) and retention enemata. It was also the experience of those treating cases returned from the East to the United Kingdom.

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TABLE I—RELATION OF RELAPSE-RATE TO DURATION OF SYMPTOMS BEFORE TREATMENT

Duration of symptoms (months)	No. of cases	No. of relapses	Percentage of relapses
0–2	208	11	5·2
2–4	23	5	23
4–6	10	4	40
6–8	10	4	40
8–10	0	..	..
10–12	4	2	50
12–14	8	4	50
14–16	3	3	100
2–16	58	22	37·9

Priest (1945) found that 49·4% of such cases had not been cured after full courses of treatment, and Lamb and Royston (1945) noted that of 26 chronic cases followed up for nine weeks after apparent cure 24 relapsed.

It is difficult to explain this intractability of war-time infections. Adams (1945) suggested that the amœba was either unusually virulent or had acquired resistance to emetine as a result of inadequate treatment. The evidence on this subject, however, is conflicting, and the explanation is more likely to lie in a combination of other factors. In war, troops are protected by a less satisfactory standard of hygiene than in peace-time cantonments and are consequently much more liable to bowel infections. The longer they are exposed to such conditions the greater is their liability to amœbiasis. The early period of overseas service, on the other hand, shows a relatively high incidence of bacillary dysentery. Fig. 1 shows the length of overseas service in 819 bacillary and 276 amœbic cases. It is noteworthy that the earliest case of amœbic dysentery in this series had been in India for only fourteen days. Under war conditions the facilities for diagnosis are often inadequate; and, even if amœbic dysentery has been diagnosed, adequate treatment is often not obtainable. This means that a long interval elapses between the onset of symptoms and the beginning of proper treatment. Table I shows that the length of this interval is closely related to the tendency to relapse. The average duration of symptoms before proper treatment was begun was six weeks in cases that were cured, whereas in those that relapsed it was six months.

TABLE II—NUMBER OF SPECIMEN OF STOOLS EXAMINED IN WHICH *E. histolytica* WAS FIRST FOUND

No. of specimen	1	2	3	4	5	6	7	8	9	10	11	12	13	22
No. of cases	178	33	18	9	5	8	4	8	3	4	2	3	2	1

Though 229 (*83* %) showed vegetative *E. histolytica* in one of the first three stools, 49 (*18* %) required examination of further stools.

DIAGNOSIS

The importance of early diagnosis became very clear during the investigation, making it worth while to describe the methods used.

On the day of admission a careful history and physical examination were recorded and a fresh stool was examined in the dysentery laboratory adjacent to the wards. The importance of the stool being examined while really fresh is shown by the fact that amœbæ have been observed by us to become rounded, immobile, and no longer identifiable within 5–10 min. of being removed in a swab from an amœbic ulcer.

On the day after admission sigmoidoscopy was done as a routine in all cases. No sedatives were found necessary, and no patient was considered too ill for sigmoidoscopy. The distance to which the instrument was passed, however, depended on the severity of the inflammation and ulceration; and, when gross lesions were seen in the first 4 in. of mucosa, it was obviously unnecessary and unsafe to proceed farther.

With this routine the history, physical examination, sigmoidoscopic appearances, swab from bowel mucosa, and stool findings could be correlated with one another.

Each case was then assessed within twenty-four hours of admission as: (1) proved amœbic dysentery in which vegetative *Entamœba histolytica* was found; (2) bacillary dysentery, or diarrhœa without evidence of amœbiasis; or (3) a doubtful case with suggestive findings. In (1) and (2) appropriate treatment was begun, and in (3) stool examinations were continued for a week, after which sigmoidoscopy was repeated, and the investigation was continued for a further week if the findings were still suspicious. The importance of examining several stools is illustrated by table II.

Some patients were given anti-amœbic treatment on suspicion, but only the cases in which active vegetative *E. histolytica* was seen were included in the present series. A warm stage and warm saline were used, and material from rectal or sigmoid swabs was immediately examined under the microscope in the sigmoidoscopy room. A diagnosis was made only when both typically motile *E. histolytica* and ingested red cells were seen.

TABLE III—RESULTS OF TREATMENT

Group	No. of cases	No. of follow-up cards received	Final result not known	Av. no. of previous attacks	Av. duration of symptoms (days)	No. of relapses	Relapses %
I	60	52	8	0·25	50	4	7·7
II	42	38	4	0·25	29	3	7·9
III	43	40	3	0·40	57	4	10·0
IV	42	39	3	0·88	89	6	15·4
Miscellaneous	20	19	1	0·65	94	3	15·8
Penicillin (*a*)	33	29	4	1·80	139	11	38·0
Penicillin (*b*)	59	53	6	0·15	50	1	1·9

TREATMENT

General.—After the acute stage was over, a low-residue diet providing 3000 calories daily with vitamin concentrates was given, and patients were confined to bed for 15–18 days. It was not because of the toxicity of emetine or E.B.I. that this period of rest was enforced. But, course or no course, the patients were kept in bed for a corresponding period. In the present series of 279 cases and in a further 250 cases no toxic manifestations were seen. The importance of rest and diet in treatment was demonstrated by 3 patients who were carefully observed over a month without specific treatment. They subsequently relapsed, but for a time the dysentery became quiescent, ulceration not originally severe healed, and the stools became formed and free from amœbæ.

Specific.—After diagnosis each case was placed in one of four groups in strict rotation irrespective of the type of case. Details of each course of treatment are shown schematically in fig. 2.

Group I was the standard course in use in India. By comparing it with group II the value of the addition of succinyl sulphathiazole could be assessed. By comparison of group II and group III it could be determined whether diodoquin by mouth was as effective as retention enemata of quinoxyl.

Diodoquin (5, 7-*diiodo*-8-*hydroxyquinoline*) has been referred to by Morton (1945) and by Hargreaves (1946). It was the subject of favourable reports first by Craig (1937), Silverman

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(1937), and Hummel (1940), who claimed cure in 100% of cases. These results were not confirmed by Morton, who concluded, however, that it was the best of the oxyquinoline group and a valuable addition to the drugs already in use.

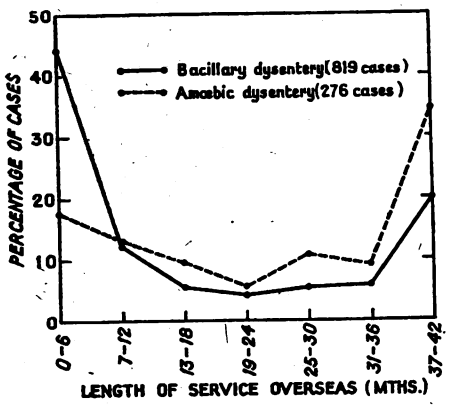

Fig. 1—Relation of overseas service to cases of bacillary and amœbic dysentery.

E.B.I. — Dobell (1917) recommended that E.B.I. should be given as a powder in gelatin capsules. He emphasised that it should never be given as a compressed or as a keratin- or stearin-coated tablet. Though this has been repeated by many others, E.B.I. is still often distributed and administered in tablets. In this investigation 3 patients were given E.B.I. tablets and a straight radiogram of the abdomen nineteen hours later showed in each case small rounded opacities, which could only have been caused by unbroken tablets. One other, a quiescent case, passing cysts, had diarrhœa on the eighth day of treatment with these tablets and passed vegetative *E. histolytica* in his stool. These cases and a number of others similarly treated showed none of the grey discoloration of the stools characteristic after proper administration of E.B.I.

PENICILLIN

Early in the investigation it became apparent that, though the fresh cases responded well to a thorough course of treatment, the relapsing cases and those with a long history before treatment did not. This was the common experience of many who had treated amœbic dysentery both in the U.K. and overseas. The possible reasons for the relative failure of treatment have been discussed, but a further important factor appeared to be a secondary bacterial infection. Isolation of a pathogenic organism or the finding of a bacillary exudate was considered sufficient evidence of such infection, and on this basis secondary infection was present in 41% of all cases—a figure much higher than was anticipated. This was thought to be a striking and important observation. It was found, however, that the incidence was not significantly greater in the chronic than in the fresh cases:

	No. of cases
Total	278
With secondary infection	114 (*41%*)
Without ,, ,, ...	164 (*59%*)
Chronic cases with secondary infection ..	95 (*42%*)
Fresh cases ,, ,, ,, ..	19 (*36·5%*)

These figures do not include 22 patients who had a bacillary exudate during or after treatment, because cross-infection from other cases of bacillary dysentery in the wards could not be excluded with certainty, though it was unlikely.

It was clear that this secondary infection had to be taken into account in planning treatment (Wright 1945). Acton and Knowles (1928) were aware of this nearly twenty years ago and advocated the use of vaccines prepared from the stools. There appeared to be every indication therefore that such drugs as succinyl sulphathiazole and penicillin would be valuable adjuncts to specific treatment.

Succinyl sulphathiazole was already undergoing trial in groups II, III, and IV of this series. Its effect on gram-negative organisms was described by Mackenzie (1944).

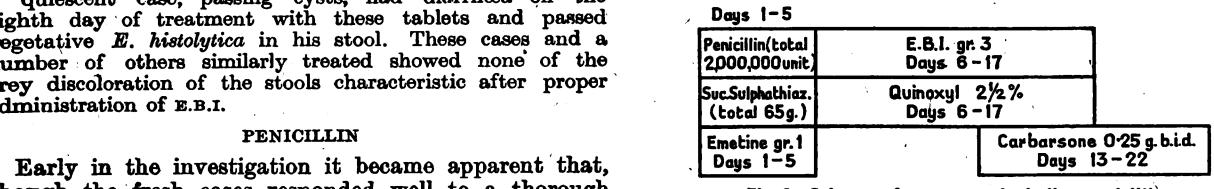
GROUP I
Emetine gr. 1 Days 1-6
E.B.I. gr. 3 Days 7-12
Carbarsone 0·25 g. b.i.d. Days 13-25
Retention enemata (Quinoxyl 2½%) Days 5-14
E.B.I gr. 3 Days 20-25
GROUP II
Emetine gr. 1 Days 1-6
E.B.I. gr. 3 Days 7-12
Carbarsone 0·25 g. b.i.d Days 13-25
(tot. 65g. Days 1-3
Quinoxyl 2½% Days 5-14
E.B.I gr 3 Days 20-25
Succinyl Sulphathiazole
GROUP III
Emetine gr. 1 Days 1-6
E.B.I. gr. 3 Days 7-12
Carbarsone 0·25 g. b.i.d. Days 13-25
Diodoquin gr. 9·6 (3 tab.) t.i.d Days 1-20
(tot. 65g. Days 1-3
Succinyl Sulphathiazole
E.B.I. gr 3 Days 20-25
GROUP IV
Emet. gr. 1 Days 1-3
E.B.I. gr. 3 Days 4-15
Diodoquin gr. 9·6 (3 tab.) t.i.d Days 1-20
(tot. 65g. Days 1-3
Succinyl Sulphathiazole

Fig. 2—Schemes of treatment for four groups of patients.

Days 1-5
Penicillin (total 2,000,000 unit)
E.B.I. gr. 3 Days 6-17
Suc. Sulphathiaz. (total 65g.)
Quinoxyl 2½% Days 6-17
Emetine gr. 1 Days 1-5
Carbarsone 0·25 g. b.i.d. Days 13-22

Fig. 3—Scheme of treatment including penicillin.

Encouraging results with penicillin in resistant cases have been recorded by Hargreaves (1945a and b, 1946) and by Willmore (1945). Based on these reports a course of treatment was devised consisting of 2,000,000 units of penicillin and 65 g. of succinyl sulphathiazole, followed by E.B.I. and quinoxyl enemata for twelve days and carbarsone for ten days (fig. 3). Because of their undoubted value in relieving acute symptoms, emetine injections were given in the first five days to patients with very severe diarrhœa or with acute abdominal pain or rigidity.

The first patient to receive penicillin—in March, 1945—showed a dramatic response.

This man had been in hospital for over four months, and after four courses of treatment was still passing 6 loose motions a day, containing blood and mucus and vegetative *E. histolytica*. He had lost about 2 st. in weight, and on sigmoidoscopy severe extensive ulceration was seen. After penicillin and succinyl sulphathiazole, and before specific treatment, the stools still contained *E. histolytica* but were reduced to 2 in twenty-four hours. On sigmoidoscopy a remarkable change had taken place. Bright hyperæmic patches were present, but the ulceration had healed The patient was next given specific treatment as described and was cured.

In all, 92 patients were given penicillin. Sigmoidoscopy was carried out before and after penicillin, and in every case in which ulceration was initially seen there was striking improvement.

TEST OF CURE

After treatment was completed the patient was retained in hospital for a further ten days, during which 6 stools were examined and sigmoidoscopy was done. He then went to a convalescent depot for three weeks on an ordinary diet, after which he returned to hospital for a week. Three more stools were examined, and

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sigmoidoscopy was repeated. If he was apparently cured he was discharged from hospital and given a printed postcard which he was required to complete and send to us in three months' time—i.e., four months after the end of treatment—saying whether or not he had relapsed.

After considerable correspondence, cards were eventually received from 88% of all cases, and only these cases have been considered in calculating the final results.

RESULTS

Sigmoidoscopy.—The importance of sigmoidoscopy and of a swab from the mucosa in the routine investigation of all cases of diarrhœa is further demonstrated by the fact that the sigmoidoscopic appearances were regarded as indicating or strongly suggesting amœbiasis in 88% of the cases in which vegetative *E. histolytica* was found. Further, vegetative *E. histolytica* was found in the swab at sigmoidoscopy in 61%, and in 21% it was found in the swab when the stool was negative.

Treatment.—Cure was effected in 97·5% of primary cases with symptoms lasting two months or less; 96·1% of all primary cases were cured, 85% of cases with one previous attack, and only 58·4% of those with more than one attack. The penicillin cases are divided into two subgroups: (*a*) 33 selected cases with a long history before treatment, several previous attacks, or severe ulceration; and (*b*) 59 unselected cases. Table III shows the results in the different treatment groups.

SUMMARY

An investigation of amœbic dysentery in India during the late war showed the great importance of early diagnosis.

The relapse-rate increases with the duration of symptoms and the number of previous attacks.

If amœbic dysentery is diagnosed early enough, a very high proportion of cases can be cured with adequate treatment by any of the methods described here.

In the groups treated without penicillin, the results show no significant difference when the average duration of symptoms and the average number of previous attacks are taken into account.

The addition of succinyl sulphathiazole alone to a course of treatment is of no value.

Diodoquin given by mouth is as effective as quinoxyl retention enemata. Therefore retention enemata, which are inconvenient and time-consuming, should be discarded.

Evidence of secondary bacterial infection in 41% of cases was the basis for the use of penicillin. Only 1 of 53 unselected cases treated with penicillin relapsed. Though statistically this is not highly significant, it is certainly encouraging.

In the 33 severe selected cases treated with penicillin the relapse-rate was 38%, which is disappointing in view of previous reports, but compares favourably with the relapse-rate of 91% in a similar series treated without penicillin by Lamb and Royston (1945). Of the 11 patients who relapsed, 4 were subsequently cured with a second combined course; 1 other had malaria, typhoid, and kala-azar while in hospital; and 2 others, during an acute shortage of reliable E.B.I., were given a batch of the drug which was subsequently shown to have an unsatisfactory emetine content.

The remarkable improvement seen on sigmoidoscopy after penicillin was beyond doubt.

We consider that penicillin is a valuable advance in the treatment of amœbic dysentery.

We wish to thank the commanding officer and staff of 133 I.B.G.H. (B.T.) for their help, the consultants in India for their advice, and the Director of Medical Services in India for permission to publish this paper.

References at foot of next column

PRIMARY MENINGOCOCCAL CONJUNCTIVITIS IN CHILDREN

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THE finding of intracellular gram-negative diplococci in pus from the eyes of an infant or a young child still suggests gonococcal infection to most doctors. This is because of the emphasis which has been laid on gonococcal ophthalmia since the early days of this century, and the paucity of reference to infection with the morphologically similar, but socially less discreditable, meningococcus. Distinction between these infections requires full bacteriological investigation, but the difficulty of obtaining satisfactory cultural results from material taken in isolated clinics and small hospitals has often led to undue reliance on the microscopical examination of stained films.

The possibility that neisseriæ other than gonococci might cause conjunctivitis was certainly appreciated by Bumm (1884), who isolated three such strains from the genital tract of female patients suspected to have gonorrhœa, but his experimental endeavour to infect the normal conjunctiva with one of them was unsuccessful.

Early claims, however, such as those of Fraenkel (1899) and Haglund (1901), to have isolated meningococci from primary conjunctivitis are open to criticism on bacteriological grounds (Brons 1909).

It was not unusual to find meningococci in the conjunctivæ of patients with cerebrospinal meningitis (Randolph 1893, Robinson 1906); and both Smith (1905) and McKee (1909) isolated the organism from normal eyes in single instances.

The case of meningococcal conjunctivitis described by McKee (1913) was probably associated with a mild or abortive meningitis, very similar to the more recent case of meningococcal uveitis described by Bride (1929). Reports of primary conjunctivitis, however, were rare.

Stephenson (1907) certainly felt justified in stating: "the discovery in cases of pronounced infantile purulent ophthalmia of grouped intracellular diplococci, not staining by Gram, is for all practical purposes conclusive of the presence of gonococci"; but he very properly advises caution in the ophthalmias of older babies.

Brons (1909) undoubtedly described a case of meningococcal conjunctivitis, and one of the three ophthalmias in adults described by Verderame (1910) was probably due to this organism.

From 1916 to 1943 the *Index Medicus* recorded only five papers on meningococcal conjunctivitis not associated with meningitis (Ker and Douglas 1916, Theisen 1929, Gifford and Day 1935, Hayden and Hayden 1939, Clifton and Laird 1941). Bennett (1940) described 1 case.

Later reports have been more numerous. Theodore and Kost (1944), who found meningococcal conjunctivitis in 8 soldiers, suggested that the incidence of meningococcal

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conjunctivitis was high when meningococcal meningitis was prevalent.

However, most of these infections and those described by De Bord (1943), Thygeson (1944), and Bauer et al. (1944) were in adults, in whom a neisserian ophthalmia was more likely to be investigated bacteriologically.

Reid and Bronstein (1944) described infection in a child, and Mangiaracine and Pollen (1944) found meningococcal ophthalmia in 10 children, of whom 2 were babies less than a year old. These authors suggested that the apparent recent increase in meningococcal conjunctivitis might be due to the misdiagnosis of earlier cases.

Most of the reports have come from America, where cultural facilities for the diagnosis of neisserian infections have been greatly developed in recent years.

Kahaner and Lanou (1945), who dealt with a single case, emphasised the need for cultural and serological differentiation of the neisseriæ responsible for suppurative conjunctivitis. They pointed out that a diagnosis of gonococcal ophthalmia based only on the clinical characters of the lesion and the presence of gram-negative intracellular and extracellular diplococci in the discharge might be wrong.

In this country the only recent indication of the occurrence of infantile meningococcal conjunctivitis is the mention without comment of 6 instances among 737 consecutive cases of ophthalmia neonatorum in London (Sorsby 1945).

In Glasgow it has been the practice during the past twelve months to take specimens for culture from all ophthalmias referred to a special clinic when suspicion of gonococcal infection was raised on clinical grounds or after smear examination. These specimens were sent to the Central Public Health Laboratory by the method detailed by Stuart (1946). This method is briefly as follows:

Specially prepared absorbent cotton-wool swabs on wooden applicators are used. A specimen of discharge is obtained from the affected eye, and the swab is then placed in a small screw-cap bottle containing a non-nutrient sloppy agar medium with sodium thioglycollate as a reducing agent. The swab stick is then broken off short and the cap screwed firmly on. Under anaerobic conditions gonococci remain viable often for several days, and meningococci also can readily be recovered from such specimens.

In the laboratory the swabs are plated on a chocolate-agar medium (McLeod et al. 1934) and on an unheated blood-agar medium of the same composition. The plates are incubated at 36°C in an atmosphere containing 10% carbon dioxide.

Thirty patients were investigated, from whom thirty-four swabs were taken. Gonococci were grown from 8 cases and meningococci from 5 others. Seventeen cases were not due to neisserian infection. Clinical details and the results of smear examination of the meningococcal cases are given below. A sixth case, obtained from another source, is described in which the diagnosis was retrospective.

CLINICAL DETAILS AND SMEAR FINDINGS

Case 1.—Girl aged 10 years. Illness began Feb. 5, 1946, with swelling and pain in left eye. A thin serous discharge appeared and rapidly became purulent. She was admitted to hospital three days later as a case of conjunctival diphtheria.

Left eyelid was then much inflamed, tense, and swollen. A profuse greyish-yellow slightly bloodstained discharge was evident, and patient was decidedly toxic. Next morning the temperature, normal on admission, reached 100°F, but by evening had fallen to normal.

The ophthalmologist reported on Feb. 10 that the cornea was hazy but showed no gross ulceration. Some ulceration of the circumpalpebral conjunctiva was seen. Three days later, however, an opaque membranous exudate was still present over the central area of the cornea; and, though the condition resolved rapidly, the child was finally discharged from hospital for further observation with a diffuse nodular opacity in that area of the cornea.

Admission smear, left eye: polymorphs ++, numerous gram-negative intracellular diplococci.

Case 2.—Child aged 6 years. Illness began March 26, 1946. Next day on admission eyelids were swollen and inflamed, and conjunctivæ deeply injected. Profuse purulent discharge.

Smears, both eyes: polymorphs ++, gram-negative intracellular diplococci numerous.

Case 3.—Baby aged 9 weeks. Illness began May 7, 1946. Next day left eye was discharging profusely and eyelids were swollen and inflamed. Right eye less affected. Both corneas clear.

Smears, both eyes: polymorphs ++, gram-negative diplococci few, mostly single and extracellular.

Case 4.—Baby aged 12 weeks. Illness began Feb. 25, 1946. When seen three days later, both eyes were swollen and red with a fair amount of discharge. Corneas clear.

Smears, both eyes: polymorphs ++, masses of gram-negative diplococci, many intracellular.

Case 5.—Baby aged 14 weeks. Onset May 18, 1946. On admission next day both eyes were swollen and inflamed, with profuse purulent discharge. Corneas not affected.

Smears, both eyes: polymorphs ++, numerous gram-negative diplococci, intracellular and extracellular.

Case 6.—Baby aged 12 weeks. Onset about Feb. 26, 1947. Two days later both eyelids were red and swollen, with a fair amount of thick purulent discharge. Cornea of right eye hazy and showed a small peripheral ulcer; left cornea clear.

Smears, both eyes: polymorphs and gram-negative diplococci, intracellular and extracellular.

COURSE AND TREATMENT

Sulphathiazole was given routinely to all cases treated in the special clinic, 0·125 g. every four hours to babies, and 0·5 g. to older children. The affected eyes were douched two-hourly with 0·4% saline. When the discharge had diminished greatly, douching was reduced to twice daily, and the sulphathiazole dosage was generally reduced after the third day. In 2 cases 1 drop of a penicillin solution containing 2500 units per ml. was instilled into the affected eyes every half-hour until the discharge and swelling had disappeared, and subsequently at increased intervals for three days.

The result after only one or two doses of sulphathiazole was often dramatic. Discharge ceased and the swelling diminished rapidly. Eyes which had appeared seriously affected were sometimes practically normal in twenty-four hours. In all clinic cases the inflammation resolved rapidly and there was no impairment of vision. Case 1 was more serious and, though treated immediately and intensively along the same lines after admission to hospital, was eventually discharged with a residual corneal opacity.

ÆTIOLOGY

The obvious and most likely source of infection in these cases was a meningococcal carrier, probably a member of the patient's family. In case 3 a postnasal swab from the child's mother gave a profuse culture of neisseria, but *N. meningitidis* was not detected. The sister of case 1, however, carried meningococci in her nasopharynx, but a specimen from her brother was negative. Though meningococci were not isolated from this case of ophthalmia, the finding of meningococci in such a close contact, together with the social history of the small patient, was sufficient to allow a retrospective diagnosis of her known neisserian infection. In case 6, an only child, the father and mother were examined. The father's swab was negative, but the mother's gave a profuse growth of *N. meningitidis* group I. In this instance, therefore, the probable method of transmission of the infection was confirmed.

Reid and Bronstein (1944) suggested the importance of a catarrhal state in the meningococcal carrier, but in the present series no such history was obtained. It has before been adequately demonstrated that the meningococci from one person's nasopharynx can produce an acute conjunctivitis in a close contact (Smith 1905, Reese 1936, Hayden and Hayden 1939).

The interesting suggestion of Theodore and Kost (1944) on the correlation between the incidence of

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cerebrospinal meningitis and meningococcal ophthalmia was not supported. In Glasgow cerebrospinal meningitis had its peak incidence in January, 1946, but the rise in that month was nothing more than seasonal, and the figure for May, when most of the cases occurred, was well below the average. It is known, however, that the percentage of meningitis carriers in the population is not always proportionally related to the incidence of meningitis (Dudley and Brennan 1934), but it is possible that there may be some relationship between the number of meningococcal carriers and the occurrence of meningococcal ophthalmias.

BACTERIOLOGY

Eye swabs in the transport medium already described were received from all cases except case 1. In two instances owing to the intervention of a public holiday the swabs were two days old when received. In all other instances they were received the day after they were taken. The specimens were cultured according to the routine used for gonococci. Luxuriant growths of neisseria in practically pure culture were obtained from all specimens.

SEROLOGY OF EYE NEISSERIÆ

Strain	Antisera			
	Meningococcus group I	Meningococcus group II	Strain 3	Strain 4
3	250	25	1250	1250
4	250	25	1250	500
5	250	25	1250	1250
6	250	0	1250	500
Gonococcus A	25	25	25	25
„ B	0	0	0	0
„ C	0	0	0	0
„ D	0	0	0	0

Suspicion that an organism other than gonococcus was present was aroused first by the luxuriance of growth after twenty-four hours' incubation. In case 2, the first case diagnosed by direct culture, the colonies were fully 1 mm. in diameter—i.e., larger than most gonococcal colonies after forty-eight hours. This finding was common to all cases.

On close examination the colonies showed other features more characteristic of meningococci than gonococci. They were large, dome-shaped, and juicy, occasionally almost mucoid, and had an entire evenly rounded edge. They were moderately translucent when young, but always somewhat denser than gonococci; this density varied from a faint opalescence to a distinct opacity.

All strains fermented dextrose and maltose actively. An interesting feature common to them was a pronounced irregularity in cultural behaviour; luxuriant cultures only forty-eight hours old would suddenly fail to grow when subcultured to fresh media. This phenomenon was very selective. A strain would suddenly cease growing on chocolate-agar but would still grow on unheated blood-agar, or vice versa, or would perhaps grow only on inspissated serum. This aberration was not permanent; after another one or two subcultures it would again grow on all media. The phenomenon was not due to any alteration in the culture media, because two meningococcal strains cultured at the same time on the same batch of media would vary in selectivity, each growing only on a different medium.

Meningococcal grouping sera were not available when the first strain (case 2) was isolated, and the organism was lost. Antisera were prepared against two other strains subsequently isolated. Four meningococcal conjunctivitis strains and four gonococcal ophthalmia strains were tested with these sera and with meningococcal group sera (Standards Lab.). The accompanying table shows that all the meningococci belonged to group I.

DISCUSSION

The detection in less than a year of no fewer than 6 cases of meningococcal conjunctivitis suggests that the incidence of this type of infection is greater than commonly imagined. During the same period only 8 cases of true gonococcal ophthalmia were found in the same special clinic. Of the 6 cases described 4 were referred from certain Glasgow hospitals as gonococcal conjunctivitis, and without cultural examination they could not have been diagnosed otherwise.

The suggestion by Hayden and Hayden (1939) and others that meningococcal ophthalmia is clinically milder than gonococcal ophthalmia has not been confirmed. In the early stages of infection the two conditions can be equally severe, and it is noteworthy that two of the cases described showed corneal ulceration. It is highly probable, then, that many meningococcal ophthalmias are erroneously diagnosed as gonococcal infections.

Admittedly, from a clinical point of view there is little purpose in differentiating the two conditions. Both respond readily to sulphonamides; indeed the response of the meningococcal cases was dramatic. From a sociological point of view, however, the situation is very different. The amount of worry and suspicion which can be aroused in a restricted family circle by the suggestion that a young child belonging to that family has developed venereal infection cannot be overestimated. It is true that none of the cases described falls into the prescribed ophthalmia-neonatorum notification period, but it is equally true that most of them are of an age at which the finding of gram-negative intracellular diplococci in pus from an acute conjunctivitis inevitably suggests a gonococcal infection to most observers.

Most clinical workers from their own experience or from a study of recent literature will recall cases described as gonococcal ophthalmias on microscopical evidence, in which the source of infection remained undiscovered. The evidence here produced will suggest the advisability of cultural examination in such cases. Indeed it is probably true, as Kahaner and Lanou (1945) suggest, that a diagnosis of gonococcal ophthalmia based only on the clinical characters of the lesion and the presence of gram-negative intracellular and extracellular diplococci cannot be substantiated.

SUMMARY

Six sporadic cases of acute meningococcal conjunctivitis in infants and young children are described.

Meningococci were isolated from five of these infections, and in four instances belonged to group I.

In two instances meningococci were present in the nasopharynx of a close contact, and the probable source of infection in all cases was the respiratory tract.

Attention has been drawn to a simple method, which overcomes the frequent difficulty of immediate culture, for transporting specimens from an outlying clinic to a central laboratory.

The possibility of confusion between meningococcal and gonococcal conjunctivitis is emphasised, and the importance of full bacteriological investigation is urged.

We wish to thank Dr. T. Anderson, lately physician-superintendent of Knightswood Hospital, for the details of case 1.

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SUPRARENAL HÆMORRHAGE AND PREGNANCY

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MASSIVE suprarenal hæmorrhage is rarely encountered, but the publication of cases from time to time during the last few years has gradually enabled us to form a picture of its salient features. MacMillan (1947) has suggested that it can be classified as associated with four different clinical states:

(1) Involution of the gland subsequent to pregnancy or in the newborn; destruction by neoplastic invasion.
(2) Vascular damage by toxæmia, trauma, septicæmia, or arteriosclerosis.
(3) Hypertension.
(4) Generalised hæmorrhagic tendency.

Though the evidence for most of these causes is now fairly conclusive, the suggestion that massive suprarenal hæmorrhage is associated with puerperal involution of these glands needs much more confirmation than is provided by the only 3 cases of suprarenal hæmorrhage in association with pregnancy that have as yet been reported; these are analysed below following the report of a fourth case.

CASE-RECORD

A woman, aged 33, had had one child and three abortions; she had had no serious illnesses and enjoyed good health. She was admitted to the West Middlesex County Hospital on April 24, 1944, with a threatened abortion, when she was 2 months pregnant. The cause of the repeated abortions could not be determined by routine investigations, and after rest and sedatives, progesterone, and vitamin E, the bleeding stopped and the pregnancy was conserved. She was discharged home after 10 days.

A month later she was readmitted to hospital collapsed and pulseless. She spoke with difficulty, but said that 2 hours before admission she had miscarried and subsequently had felt "very ill." She did not complain of pain. Her colour was excellent, but her breathing was shallow, her pulse was imperceptible, and her blood-pressure could not be recorded. There was a slight loss of blood per vaginam. In spite of continuous inhalation of oxygen she became cyanosed and died 20 min. after admission.

Necropsy.—A bulky puerperal uterus was found, with no evidence of trauma or infection. No abnormality was found in the viscera except the suprarenal glands, which were both enlarged and infiltrated with massive hæmorrhages. No venous thrombosis was visible to the naked eye.

The sections were reported on by Dr. A. C. Counsell as follows: "There is enlargement and disorganisation of structure of the suprarenal by diffuse extravasation of red blood corpuscles. In many parts of the section the appearance is that of masses of closely packed red blood corpuscles containing isolated cortical cells. There is no impairment of nuclear staining of the parenchymal cells, but the cytoplasm shows well-marked fine vacuolation. Sections of kidney and motor cerebral cortex show no gross pathological change."

DISCUSSION

In this case death took place about $2^1/_2$ hours after a $3^1/_2$ months' abortion. It is impossible that such a rapid termination could be induced by physiological involutional changes in the suprarenals; it is more conceivable that the suprarenal hæmorrhages were responsible for the abortion. Since abortion had previously threatened, and since the patient had had three other abortions of unknown cause, there may have existed in her case an abnormal hormonal reaction to pregnancy, involving the suprarenal glands.

The following 3 cases of suprarenal hæmorrhage associated with pregnancy have previously been reported:

(1) Hall and Hemken (1936) recorded suprarenal hæmorrhage in a girl aged 18 years, in the early months of her first pregnancy, which was complicated by severe hyperemesis gravidarum. The sole lesion found at necropsy was in the suprarenal glands, where there was an extensive hæmorrhage in the medulla and cortex on the left, and smaller hæmorrhages in the gland on the right. Microscopically there were extravasation of blood, necrosis of the cortical cells, leucocytic infiltration, and thrombosis of some of the medullary veins.

(2) Keele and Keele (1942) reported their well-known case of hæmorrhagic infarction of the right suprarenal gland, secondary to thrombosis of the suprarenal vein, occurring when the patient was 32 years old and 8 months pregnant, and resulting in death. Clinical features of this case were the severe right-sided subcostal pain, excessive vomiting, absence of shock with a normal blood-pressure, and a pulse-rate which did not exceed 88 per min. At necropsy the left gland was normal, whereas the right was the size and colour of a plum; a thrombus filled the suprarenal vein and protruded into the inferior vena cava.

(3) Dodds (1945) recorded a case of bilateral suprarenal hæmorrhages in a primipara aged 34, ending fatally 4 days after delivery. Clinically, the patient had had mild pre-eclamptic toxæmia, and during labour had self-administered 'Trilene' in the second stage. After delivery she vomited several times, became jaundiced, and later complained of right subcostal pain before death. At necropsy there was massive necrosis of the liver, with bilateral suprarenal hæmorrhages which on microscopy revealed cortical extravasation of blood, focal necrosis, and leucocytic infiltration.

It is doubtful if in any of these 4 cases the puerperal involution of the suprarenal glands can have contributed to the massive hæmorrhage and death of the patient. Two cases occurred during pregnancy, the third $2^1/_2$ hours after abortion, and the fourth during the puerperium of a full-time pregnancy. In this last case—the only one in which involutional changes might be cited as a cause—the patient already had toxæmia, a low-protein diet was given as treatment, and she had had trilene analgesia. One or more of these factors had caused liver necrosis, and might therefore be reasonably expected to play a rôle in causing the pathological changes observed in the suprarenal glands.

Keele and Keele's case was the only one characterised by severe pain, excessive vomiting, and absence of shock; and the only one in which complete thrombosis of the suprarenal vein was found. Here the cause was the mechanical blocking of the main vein of the right gland while the left functioned normally; the clinical picture was accordingly different, and was not typical of acute suprarenal insufficiency. Involutional changes can certainly be excluded in this case.

The association with hyperemesis gravidarum in Hall and Hemken's case is interesting in that suprarenal cortical insufficiency is sometimes cited as a cause of this condition; however, no-one has suggested that involution of the gland can ever occur in early pregnancy.

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It will be noted that in the present case there was no evidence of necrosis, thrombosis of veins, or infiltration with leucocytes; death supervened too soon after the hæmorrhages for these changes to become manifest.

It cannot be proved that the rapid involution of the suprarenal glands during the neonatal period does not cause hæmorrhage, but this is most probably so. The physiological fall in the prothrombin content of the blood after birth and the hæmorrhagic tendency thereby induced, plus trauma received during delivery, plus asphyxia, plus the possibility of an overwhelming infection which often occurs at this period of life, may contribute towards the suprarenal hæmorrhage without calling upon an involution hypothesis.

SUMMARY

A fatal case of suprarenal hæmorrhages is described in a woman who died $2^1/_2$ hours after an abortion.

Three previously reported cases of suprarenal hæmorrhage associated with pregnancy are discussed.

It is doubtful whether puerperal or neonatal involution of the suprarenal glands plays any part in the ætiology of massive suprarenal hæmorrhage.

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Reviews of Books

The Doctor's Job

CARL BINGER, M.D. London: George Allen & Unwin. 1947. Pp. 243. 12*s.* 6*d.*

THIS book drives home the change of outlook which has become inevitable following many recent developments in the study and practice of medicine. The author brings to his subject an intimate understanding, and touches on all aspects of the doctor-patient relationship. He discusses sympathetically the problems of human thought, emotion, and behaviour, and analyses both the doctor's mental make-up and that of his patient. Dr. Binger seems to be the happy possessor of a sane philosophy of life which he indulges temperately. He writes in an easy conversational style which adds to the attraction of his book, and most of it is within the compass of the thoughtful lay reader.

Detoxication Mechanisms

The Metabolism of Drugs and Allied Organic Compounds. R. TECWYN WILLIAMS, PH.D. Wales, D.SC. Birm., senior lecturer in biochemistry, University of Liverpool. London: Chapman and Hall. 1947. Pp. 288. 25*s.*

THE appearance of this book is to be welcomed since detoxication mechanisms have received little attention in textbooks of biochemistry. The subject is a specialised one, however, and has no direct interest for the medical practitioner. The book is to be recommended chiefly to pharmacologists and research-workers. Dr. Williams's aim has been to summarise the available information on the metabolic fate of organic compounds which are foreign to the animal body. In the title he has used the term "detoxication" in its modern sense. The scope of the book is therefore not limited to processes of true detoxication, in which the toxicity of a substance is reduced or abolished in the animal body, but covers the chemical processes by which different types of organic compounds are broken down, regardless of the toxicities of the metabolites formed. The compounds discussed include aliphatic compounds; aromatic hydrocarbons, phenols, acids, alcohols, ethers, aldehydes, ketones and amides; aromatic nitro-, amino-, and azo-compounds; organic cyanides; sulphones, sulphonic acids, and sulphonamides; terpenes and camphors; heterocyclic compounds; and organic compounds of arsenic. Many of the compounds discussed are commonly used drugs. Almost all are substances foreign to the animal body, although a few natural compounds are included—e.g., nicotinic acid and its amide. The book is clearly written, well set out, and liberally illustrated with chemical formulæ. Dr. Williams has managed to present a large amount of material in a comparatively short space, to catalogue the literature, and to coördinate the facts and to assess the present state of knowledge.

Office Treatment of the Eye

ELIAS SELINGER, M.D., attending ophthalmologist, Mount Sinai, Cook County and Michael Reese Hospitals. Chicago: Year Book Publishers; London: H. K. Lewis. 1947. Pp. 542. 43*s.*

THIS book gives the personal practice of an ophthalmologist in treating minor eye conditions, though some major procedures are also described. Four-point puncture of the iris and the suture of perforating scleral wounds are among the treatments which the author considers may have to be carried out in the "office" for lack of suitable facilities elsewhere. This is not a book for the experienced man, but is intended for those beginning the specialty, and for this reason simple procedures such as removal of a foreign body from the cornea and syringing through the lacrimal passages are given in such detail that the operator can follow the description step by step. The treatment of the lids, lacrimal apparatus, cornea, conjunctiva, iris, lens, and ocular muscles is given in full, while the commoner diseases of the vitreous and retina which are susceptible to treatment are also discussed. Retinal detachment is hardly mentioned, as being outside the scope of the book; but the advice to be given to the patient on the course he must immediately follow in order to prevent blindness would not have been out of place. For the most part treatment is sound and follows current British practice. Dr. Selinger, however, advises a year's orthoptic training for all youthful squinters before operation is considered. In Great Britain this would be considered a plain waste of time for the many patients who have no chance of orthoptic cure; nor would a year's course of 'Dionin' for vitreous opacities find many supporters.

English-Spanish Chemical and Medical Dictionary (New York and London: McGraw-Hill Book Company. 1947. Pp. 692. 50*s.*).—Useful to a Spaniard wishing to translate English into Spanish, this new dictionary contains an abundance of medical terms—including, as Mr. Morris Goldberg, the author, claims, "2000 new Spanish technical terms hitherto unrecorded in any other similar dictionary."

A Manual of Fractures and Dislocations (2nd ed. London: H. Kimpton. 1947. Pp. 223. 17*s.*).—The number of short primers on fracture treatment written in the United States is perhaps a reflection of the healthy interest now being taken in this branch of surgery. It is gratifying how closely their methods follow current British practice. Prof. Barbara Bartlett Stimson's little book is nicely written and illustrated, and in many of the chapters some of her personality has been infused, but abbreviated accounts of fractures can never be wholly satisfactory. She might well reconsider her avowed intention of keeping the book short, and produce a more comprehensive textbook.

Memoranda on Medical Diseases in Tropical and Subtropical Areas (8th ed. London: H.M. Stationery Office. 1946. Pp. 396. 7*s.* 6*d.*).—This War Office handbook has long provided a useful aid to doctors in the Services, and the new edition, which has been well revised, will be warmly welcomed. All the commoner tropical diseases are adequately described, and chapters have been added on infective hepatitis, nutritional diseases, tropical eosinophilia, leprosy, the sulphonamide drugs, the application of D.D.T., and other topics. Related conditions, previously described separately, have been brought together under single headings, though the arrangement of the chapters alphabetically, under the names of the conditions described, has been retained. Presumably owing to delays in printing, a few recent subjects do not receive due emphasis: thus 'Paludrine' treatment of malaria gets scant attention and other new synthetic compounds none at all; and the interesting atypical lichen planus which some have attributed to mepacrine is not discussed. The general production is almost too good: for a working handbook, in times of austerity, art paper throughout might be denied even to a Government publication.

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THE LANCET

LONDON: SATURDAY, FEB. 14, 1948

After the Debate

AT first sight it seems a pity, as Mr. RICHARD LAW said, that Monday's debate was ever held. By a more modest and friendly speech Mr. BEVAN could have done much to correct misapprehensions about the National Health Service: but once again he showed a preference for strife, and his chief aim was to discredit his opponents. Nevertheless to those who value facts as a basis for judgment the discussion had its uses, since it revealed an attitude of the House of Commons, as a whole, which is insufficiently appreciated outside. Those who are members of Parliament, of whatever party, accept the will of Parliament. "When the Bill was before the House," said Mr. LAW, "we held very strong views on certain parts of it, and we thought then, as we think now, that the Act would have been a much better one if our views had been accepted. The decision of Parliament, however, went against us, and . . . we are not seeking to reverse the decision of Parliament by stirring up any extra-Parliamentary action." Everyone agrees that doctors as individuals are entitled to stay out of the service; but some M.P.'s are less certain about their right to organise collective abstention. Indeed, the Minister probably had most of the House behind him when he said: "The position we are taking up is that the B.M.A. have exceeded their just constitutional limitations, and that the best thing they can do now is to put on record their opinion that while they may disagree with the Act in this or that particular, or in general if they wish, nevertheless they will loyally accept the decision of Parliament and continue to agitate for such revisions as they think proper." The authority of Parliament would be weakened if it became customary to amend its Acts, at the behest of the persons concerned, before those Acts were brought into operation; and the authority of Parliament is something which Government and Opposition are equally determined to maintain.

To many doctors, on the other hand, it seems that the only chance of "agitating" successfully is to agitate now, before surrendering their present independence. They profoundly distrust the Minister and his party, and before they enter the service they want the scheme modified so as to make professional freedom more secure. Some go so far as to believe that, by a show of force, Parliament can be induced to reconsider the whole Act and build a completely new edifice of responsibilities. To these we must say bluntly that they are asking the impossible: "on whatever side of the House we sit," said Mr. LAW, "we are hoping that the National Health Service Act will be made effective, and will become effective, on the appointed day." Though there may still be talk of organising some different type of service—talk which would have been interesting five years ago—no realist can longer doubt that the main issues have been decided. We are left in fact only with certain objections concerning the general practitioner; and agreement even on these could be reached if it were sought on both sides. It is noteworthy how, as the weeks go by, the emphasis on the various items is changing. As a symbol of freedom "appeal to the courts" has, on closer examination, lost its glitter. "Negative direction" was never as unpleasant as was supposed, and has become less important now that there is a fund to attract doctors to special areas. As for the ownership of the goodwill of practices (a subject which Mr. R. A. BUTLER dismissed as "settled"), the *British Medical Journal* last week significantly suggested that it might no longer be insisted on if Mr. BEVAN were to grant the alternative safeguard of an amendment to the Act stating that general practitioners should be paid by capitation fee only. Unfortunately such an amendment, introduced by the House of Lords, was firmly rejected by the Commons, and it is hard to see Mr. BEVAN asking them to go back on their judgment. But if the basic salary is, as it seems to be, the only big remaining obstacle to agreement, he would surely be well advised to set his experts to work on overcoming the administrative difficulties that would arise from making it optional.

He will not do so, of course, unless the profession on their side show willingness to coöperate and make concessions too. "It would be wrong," as the *Manchester Guardian* says, "to expect him to give anything more away until it is clear that those who negotiate for the doctors are ready to give as well as to take." From Mr. BEVAN'S point of view the negotiations were "a long series of concessions from us, and none from the medical profession—not a single one"; and he made play with the boast of a member of the Negotiating Committee that nothing had been yielded. A big responsibility therefore rests on the B.M.A. council when it meets next week to review the result of the plebiscite. Very possibly it may, like the Minister, have the support of the large majority for which it asked—a majority in each case largely composed of people who do not fully understand the issues. If so, we must hope that it will use that support more wisely than Mr. BEVAN has used his. Whatever the result of the voting, it will, we think, make a disastrous mistake if it embarks on a policy designed to force Parliament to reverse its decisions—a policy unlikely to commend itself even to the Government's political opponents, and certain to antagonise a large proportion of the public and the press. If nevertheless, in relative isolation and despite the obvious dangers to the profession and hardship to individuals, the association recommends active resistance, we must at least ask it to say precisely what objects it hopes to attain, and why it thinks any or all of these objects attainable by force.

Folic Acid in Nutritional Anæmia

IN spite of reduced rations and the potato shortage, nutritional anæmia is still uncommon in this country. Iron-deficiency anæmia among our women is probably much commoner than is suspected, and some rather baffling normochromic anæmias prove to be due to deficiency of ascorbic acid. But the really gross forms, with severe anæmia, a megaloblastic marrow, œdema due to hypoproteinæmia, sore tongue and mouth, anorexia, diarrhœa, and disturbances of peripheral sensation, are rare and are mainly confined to mentally defective people living by themselves. Other parts of the world—India, East Africa, the West Indies, the southern States of the U.S.A.—know

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nutritional macrocytic anæmia only too well, and it is in the last two areas that the work of T. D. SPIES and his many co-workers has raised the hope that folic acid can provide a simple and effective treatment.

Folic acid was first used for patients with nutritional anæmia and leucopenia, and its success in these led to its application to cases of sprue and pernicious anæmia. For pernicious anæmia, folic acid is only of temporary value, since, although it causes the anæmia to remit, it does not prevent the combined tract degeneration in the spinal cord. The strikingly good results obtained with folic acid in the Cuban sprue syndrome have been fully described by SPIES in a small book,[1] but such cases are a minority—the majority may have diarrhœa but the stools are not fatty. It is the treatment of this latter group of patients with nutritional macrocytic anæmia that SPIES and his co-workers describe in this issue. Their patients were white and developed their anæmia because of deficiencies of their local diet, exaggerated perhaps by individual idiosyncrasy. When the condition becomes severe, a real distaste for food and the discomfort of a sore mouth and tongue soon increase the deficiency; thus a vicious circle is formed and the patient soon takes to his bed, becoming steadily weaker, more apathetic and œdematous, and still more anæmic. Assay of the diet reveals that it has been grossly deficient in protein and B vitamins for many years. Such patients are difficult to treat; they resent feeding, and persuasion is not enough to make them take a suitable diet. But they can take folic acid, 10–50 mg. a day in tablet or powder form, and then not many days pass before the patient becomes brighter, develops an appetite, loses the pain in his mouth, and takes an interest once more in his companions and surroundings; he will now eat the food he is offered and full recovery is soon attained. The anæmia remits and a reticulocyte response, like that of pernicious anæmia, occurs about the 6th day of folic-acid treatment. If the patients can be persuaded thereafter to take a proper diet no more folic acid will be needed.

It is the ability of folic acid to break the vicious circle of nutritional anæmia that is its most valuable property and may make it the most useful remedy for this widespread tropical disease. So far not many reports have come from the Old World.[2] GOODALL et al.[3] recently described their results with 10 patients in Calcutta, 4 of whom were women with very severe nutritional macrocytic anæmia after childbirth. The effects were just as good as those described by SPIES, and they consider that folic acid is superior to intramuscular liver extract. GOODALL claims that a good response was seen in 3 patients in whom no megaloblasts were found in the bone-marrow. This is unusual; SPIES and all subsequent workers have insisted that these striking results with folic acid are only to be expected in patients whose marrow does show the classical megaloblastic picture. This point is important while supplies are still limited, and GOODALL's results need confirmation. SPIES and his colleagues have thoroughly established the value of folic acid in the nutritional macrocytic anæmia of the western hemisphere. What we want now is more information from other parts of the world. It is to be hoped that the investigators will be as careful about accurate diagnosis as the American workers have been, and that they will use folic acid by itself and not in the blunderbuss mixtures with iron and liver that are now being offered to the physician.

1. Spies, T. D. Experiences with Folic Acid. Chicago, 1947.
2. See *Lancet*, 1947, i, 795.
3. Goodall, J. W. D., Goodall, H. I., Banerjee, D. *Ibid*, Jan. 3, p. 20.

Lung Affections from Cotton Dust

IN spite of complaints from time to time about the scarcity of published work on the effects of cotton dust on the lungs, CAMINITA and his colleagues in the U.S. Public Health Service [1] have been able to review 267 articles written by observers in most European countries, including Russia, and in North and South America. The main impression gained from this review is that respiratory disease among cotton operatives has many phases, none of which has been explored exhaustively. The most complete work has been done by British investigators, who seem to have ample case-material. Though Great Britain is not a cotton-growing country, about half a million workers are employed in cotton manufacture. The United States and Russia, both cotton-growing countries, have about the same number as ourselves in the cotton textile trades, but there are also other workers in ginning and cotton-seed mills, both of which are very dusty. Health conditions in Russian cotton operatives appear to be similar to those in Great Britain. In the United States, however, serious dust diseases among cotton-workers are unknown; possibly such diseases do exist but they are ignored or unrecognised or the workers leave the industry before disabling symptoms develop. "Future clinical investigations among United States cotton-workers," to quote the American review, "would probably be more fruitful if the investigators had a first-hand acquaintance with conditions described in the English textile industry." There is a good deal of evidence that cotton dust is the main cause of respiratory affections among cotton-workers, and that it can act as a mechanical irritant and as a source of allergens, of histamine, and of the toxic metabolic products of micro-organisms. There is no evidence that it acts as a source of silica, of gossypol, or of pathogenic moulds and bacteria. Gossypol, a cotton-seed lipoid known to be poisonous to animals on ingestion, has been mentioned as a possible harmful constituent of cotton dust, but no quantitative analyses of the dust for this constituent have been recorded.

Four separate disease entities associated with the inhalation of cotton dust have been reported—mill fever, byssinosis, weavers' cough, and an acute illness said to be caused by the bacterial toxin of *Aerobacter cloacæ* in workers handling low-grade stained cotton. Mill fever is characterised by irritation of the upper respiratory tract, cough, chills, fever, and at times nausea and vomiting. The symptoms arise about 6 hours after exposure to cotton dust and clear up rapidly on removal of the patient from the dusty environment. The illness usually affects those unaccustomed to breathing cotton dust. Tolerance to the dust develops after a few days, but may be limited, because exposure to a dust concentration higher than

1. Caminita, B. H., Baum, W. F., Neal, P. A., Schneiter, R. A Review of the Literature Relating to Affections of the Respiratory Tract in Individuals Exposed to Cotton Dust. Public Health Bulletin, no. 297. Federal Security Agency, U.S. Public Health Service. Washington, D.C. 1947. Pp. 86.

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usual may bring on the symptoms. Weavers' cough affects both old and new operatives handling mildewed yarn, and examination of the dust has revealed the presence of penicillium, mucor, aspergilli, and an unidentified fungus. The symptoms consist of constriction of the chest, mild but progressive dyspnœa, cough and expectoration, and aching limbs. The patient improves in 24–48 hours after removal from the source of dust. Characteristically many workers in one weaving shed are suddenly affected at the same time and the symptoms subside rapidly. If X-ray examinations were made at the height of the attacks they might reveal similarities with the appearances in "farmers' lung" [2] and in the bagassosis of sugar-cane workers. The endotoxin of *Aerobacter cloacæ* produces an illness in old and new workers exposed to the dust of low-grade stained cotton. The symptoms closely resemble those of mill fever—aching in the head and elsewhere, fever, nausea and vomiting, irritation of the upper respiratory tract, and substernal discomfort. The illness begins 1–6 hours after exposure and subsides 24–48 hours after removal from the dust. Byssinosis develops after long and continuous exposure to cotton dust. The Byssinosis Act of 1940 stipulates 20 years' employment in a cotton factory as the shortest time in which compensatable byssinosis can develop. In symptoms it resembles chronic bronchitis and emphysema and sometimes asthma. The dyspnœa is progressive and right heart failure often supervenes. The X-ray findings are not specific, being like those of emphysema with slight fibrosis. Weavers' cough and the illness due to *Aerobacter cloacæ* are acute processes; mill fever is also acute or an acute phase of a chronic disorder; whereas byssinosis represents the end-result of a chronic process. The relationship between mill fever and byssinosis is not clear. The condition known as Monday fever or Monday sickness, because it develops in cotton-workers after the weekend rest, is sometimes confused with mill fever but appears to correspond to the early stage of byssinosis.

The diseases caused by cotton dust take on an added significance when it is realised that similar conditions occur among workers who inhale other vegetable dusts, such as those of grain, flax, hemp, jute, and bagasse. Much work has been done on the effects of mineral dusts on the lungs, and it is now the turn of the vegetable dusts. In this country the extensive studies of cotton-dust diseases, FAWCITT's sustained work on farmers' lung,[2] and the investigations of HUNTER and PERRY [3] and others into the incidence and characteristics of bagassosis provide a good starting-point for a general attack.

2. Fawcitt, R. *Brit. J. Radiol.* 1935, **9**, 171, 354; 1938, **11**, 378; *Amer. J. Roentgenol.* 1938, **39**, 19.

3. Hunter, D., Perry, K. M. A. *Brit. J. industr. Med.* 1946, **3**, 64.

Annotations

B.C.G. VACCINATION

A VACCINE which has been used in millions of people over more than twenty years can hardly be said to be still in the experimental stage, but remarkably few of the published reports on B.C.G. vaccination will stand up to rigorous statistical analysis. Prof. G. S. Wilson even contends that the documentary evidence in favour of the vaccine is insufficient to prove conclusively that, in a civilised population, it has any protective effect at all. The Scandinavian experience provides the other side of the picture. In his article in this issue Prof. A. J. Wallgren remarks that the vaccine has been so successful in Sweden that it would now be impossible to provide two identical groups of vaccinated persons and unvaccinated controls, because the physicians would regard it as unjustifiable to take the risk of leaving a control group unvaccinated merely to satisfy the statisticians. Indeed, he throws the onus of providing the controls on the physicians of those countries in which B.C.G. vaccination is not yet widely practised and is looked on with suspicion. Wallgren's own confession of faith is clear. He maintains that no follow-up study of vaccinated children has so far been reported in which the vaccine has proved entirely ineffective—even the American record of Levine and Sackett [1] he believes proves this point. On the other hand, Wallgren is strongly critical of the many exaggerated claims made in the past. For instance, the vaccine clearly has no prophylactic influence on the *late* manifestations of post-primary lesions such as bone and joint, genito-urinary, and late tertiary pulmonary tuberculosis. But as the result of his extensive experience, especially with infants and children, Wallgren believes that it is now possible to define the conditions under which the vaccine can be successfully used. He lays particular stress on the necessity for repeated tuberculin testing and the protection of the child against natural infection until the B.C.G. inoculations have produced a positive reaction. When a child is known to have been recently exposed to natural infection, vaccination should be postponed for at least six weeks and then done only if the tuberculin test is negative. There is no danger in vaccinating an already infected child, but it may lead to misinterpreation of the value of the yaccination, since there is no reliable way of differentiating between tuberculin sensitivity produced by B.C.G. vaccination and that produced by natural virulent infection, though the former is usually slighter and as much as 1 mg. of tuberculin may be needed to elicit it. The duration of tuberculin sensitivity produced by B.C.G. is indeed very variable—from less than two to more than ten years—and the longer it lasts the more likely it is that a subclinical infection with tuberculosis has been successfully acquired; while the manifestation of clinical primary tuberculosis in a B.C.G.-vaccinated child is, in Wallgren's view, not always proof that vaccination has been unsuccessful. When tuberculin sensitivity disappears it is concluded that immunity to tuberculosis has probably disappeared at the same time, and revaccination is recommended.

Wallgren believes that countries which have adopted B.C.G. vaccination are satisfied as to its value and are not likely to abandon it until a more efficient prophylactic method is introduced. To his colleagues in other countries who hesitate he says: "Give B.C.G. vaccination a fair trial and you will be convinced of its effectiveness." The latest report [2] from the United States—hitherto among the firmest disbelievers in B.C.G. vaccination—will do much to encourage further trials outside Scandinavia. Rosenthal and colleagues have recorded the results of vaccinating 1417 newborn infants living in the poorest districts of Chicago but not in household contact with tuberculosis. During the ten years in which the study has been in progress there have been 11 cases of tuberculosis in this group, compared with 39 in a similar control group, showing a rate per thousand person-years 3·31 times as great in the controls as in the vaccinated. In a group of newborn infants in infected households the rate was 4·56 times greater in the controls, while in children in a federal housing scheme, in nurses and medical students, and in patients of all ages in

1. Levine, M. I., Sackett, M. F. *Amer. Rev. Tuberc.* 1946, **53**, 517.

2. Rosenthal, S. R., Leslie, E. I., Loewinsohn, E. *J. Amer. med. Ass.* 1948, **136**, 73.

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mental institutions there have been no cases of pulmonary tuberculosis in the vaccinated over a period of three to seven years. The United States Public Health Service has allotted a central laboratory (the Tice Laboratory) for the production of B.C.G. vaccine, and this institution has already provided supplies for vaccination programmes in Georgia and Michigan. This represents a radical change in the American outlook.

ELECTRICAL INJURY TO THE BRAIN

THE cerebral lesions following electric shock are rarely described in English journals and the example reported by Dickson [1] seems to be unique. Mercifully the type of accident is also very unusual and this may account for the peculiarity of the picture. The patient received an electric shock straight on to brain tissue by an illuminating retractor coming in contact with the brain through a trephine aperture. To the astonishment of her attendants she lived for 21½ hours after the accident. At the necropsy Dickson found a diffuse change in the grey and white matter of nearly the whole brain, varying in degree but all of the same nature, and he likens the appearance to the underside of a mushroom. There are a series of empty spaces, some of them radially arranged, with what appears to be compressed or coagulated tissue between them. The "disruption" was apparent to the naked eye in the cortex and basal ganglia, and was not seen at all in the cerebellum, pons, or medulla. Dickson's description differs in several respects from the appearances recorded after experimental or judicial electrocution, where the current is known to pass through the brain. In particular, the spaces in Dickson's case do not resemble the fissures or rents seen microscopically by Hassin [2] and considered by him to be due to mechanical concussion rather than heat. Neither do they appear to be the same as the vacuoles noted by Morrison et al.,[3] which, though extensive enough in the white matter to "riddle it with holes," contained some sort of basophilic coagulum. They do not even resemble the beadlike expansions along the blood-vessels described by Spitska and Radasch,[4] though these observers, like Dickson, ascribed their spaces to the liberation of steam bubbles from the moist tissues of the brain.

The picture in the present case is remarkably consistent and may be one of true "current marking" in unprotected cerebral tissue, the result of electrolytic or thermal action or both. Opinions differ on the cause of such changes, though the problem lends itself to experimental solution. Heat has so often been brought in to explain electric injuries that Morrison and colleagues did a comprehensive set of experiments to decide how far it is responsible for the damage. They found that the passage of an electric current produced no rise of temperature in the brain so long as the blood was circulating, but if the circulation was stopped there was an immediate rise. Theoretically the heat generated by the sudden transformation of electric power as the current passed might have been intense enough to produce steam in Dickson's case, since there was no intervening skin or connective tissue to use up the volts. So far as could be told from the limited number of slides at hand, many of the cerebral ganglion cells in the neighbourhood were comparatively unaltered, whereas the general rule is that the nerve-cells show all the usual signs of degeneration. But cell changes are very variable, depending to some extent on the type of current passing, and most workers have noted a fair proportion of normal-looking cells near a damaged area.

It is a great pity that this valuable specimen and many of the histological preparations were destroyed by a bomb, so that the picture is unavoidably incomplete. The notes supplied to Dickson are also lamentably insufficient, and it is to be hoped that the engineer gave the coroner more precise information about the electrical side of the accident than he gave the pathologist. There are disturbing possibilities when an induction current designed for surgical use suddenly becomes lethal, because with proper insulation of the circuits this cannot happen. It might perhaps be wise to play for safety with devices for illumination and cautery and avoid all connexion with the power station by using some other source of current.

1. Carnegie Dickson, W. E. *J. Path. Bact.* 1947, **59**, 359.
2. Hassin, G. B. *Arch. Neurol. Psychiat.* 1933, **30**, 1046.
3. Morrison, R., Wecks, A., Cobb, S. *J. industr. Hyg.* 1930, **12**, 364.
4. Spitska, E. A., Radasch, H. E. *Amer. J. med. Sci.* 1912, **144**, 341.

CURARE IN POLIOMYELITIS

THE use of curare in the treatment of acute anterior poliomyelitis is based on the view that in this disease Sherrington's law of reciprocal innervation is upset; the antagonists of affected muscles do not relax but remain in spasm, their shortening leads to deformity, and the paralysed groups are hindered in their recovery because of this opposition. At a meeting of the section of orthopædics of the Royal Society of Medicine on Feb. 3, Sir Reginald Watson-Jones showed a film made by Dr. Nicholas S. Ransohoff of the Monmouth Memorial Hospital, New Jersey, where last summer it was decided to give curare as a routine to all cases. Treatment is begun as early as possible, with three trial doses of 0·9 unit of 'Intocostrin' per kg. of body-weight at eight-hourly intervals. If there is no untoward reaction the standard dose of 1·5 units per kg. is given every eight hours until all trace of spasm is gone. As soon as each injection has had its effect—and this is checked by electromyography in some cases—regular forcible passive movements of all joints in the affected limbs, and of the spine where the paraspinal muscles are involved, are begun, and these must be carried well beyond the limits of pain. As the film shows, for acutely ill patients this procedure is so severe an ordeal as to call for the greatest determination in the physiotherapist. But, in Dr. Ransohoff's view, it is only such methodical stretching that can prevent muscle shortening and consequent deformity. The patient is encouraged to stand and walk as soon as he can, often in a few days, and no splints or callipers of any kind are employed. The whole gamut of active and assisted exercises is used, in the gymnasium, the pool, and the occupational therapy department, without any attempt to protect affected muscles against fatigue or overstretching. Fatigue, in fact, is not regarded as undesirable. It is difficult to judge the end-results from the film, though it is clear that results which compare favourably with those of orthodox management are reached in a considerably shorter time and that the patient is rehabilitated socially much earlier. Difficulties in breathing and swallowing probably benefit greatly from the use of curare.

Commenting on this treatment, Sir Reginald Watson-Jones pointed out that it is the absolute antithesis of the Robert Jones régime for paralysed muscles, and not one that he could himself accept. Prof. H. J. Seddon, who has seen the patients in New Jersey, was favourably impressed on the whole. In his view the danger of stretching the affected muscles is perhaps without much substance; it is plain that such regular overstretching can prevent shortening and deformity, and that early standing preserves the postural reflexes, so that patients do not forget how to walk. But it is surely a mistake, by allowing premature active exercises, to make excessive demands on recovering nerve-cells. The curare itself, he thought, is probably of no great importance in comparison, but the sufferings of the patients are sometimes so severe as to make one hesitate before introducing it in this country.

The film gives the impression at times that Dr. Ransohoff believes that curare has a specific curative or reversing action on the pathological changes in the

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anterior horn cells in poliomyelitis; this can only be speculative, but it acquires interest in the light of recent research. It has been shown that, if motor nerves are crushed or divided in monkeys inoculated with the virus, the corresponding anterior horn cells will not be attacked, presumably because of the central effect of the peripheral disturbance. If temporarily inactive neurones are thus immune from the disease, curare might be worth giving in the preparalytic stage on the ground that a widespread damping down of activity at the myoneural junctions would reduce the danger of degeneration in the corresponding cord neurones.

ENVIRONMENT AND MENTAL HEALTH

THE influence of environment on patterns of human behaviour has only recently been submitted to serious study. American work, quoted by Dr. R. H. Felix at the annual conference of Milbank Memorial Fund held in New York last year, suggests that such study may improve case-finding and give a line on preventive measures. Some principles have already been enunciated. Thus it seems that, in cities, mental disorders have a high rate of incidence in the central business districts, and declining rates towards the periphery. Schizophrenic rates share this general distribution, but manic-depressive rates show a much wider scatter through the city. Moreover, people living in districts not primarily populated by people of their own ethnic or racial group show much higher rates than residents of the dominant group; thus the coloured population of America is subjected to a special strain. Group influence on personality and emotional patterns is certainly considerable, and may even, it seems, outweigh physiological factors; Felix quoted Margaret Mead's study of Samoan adolescents,[1] which "failed to verify the supposedly universal impact of puberty on emotional stability." Some primitive peoples are violently aggressive and excitable, others submissive and emotionally controlled. In some societies paranoidal suspiciousness is a common trait, in others non-competitive group behaviour is the rule; others again are impassive in the ordinary way and violently excited on special occasions. (As an example of the last, New Year's eve in Scotland comes at once to mind.) Groups within groups also show special patterns: eldest and youngest sons, for instance, often have recognisable characteristics; and a man is apt to be moulded by the institutions under which he lives. The overthrow of one culture by another may disorient personality in members of the invaded race. Western culture, in particular, has led to the decay of many primitive societies, whose members, as their institutions declined, became demoralised and despondent, and failed in fertility and industry. Even well-integrated cultures may impose a severe strain on their members, where goals are hard to achieve and the demands made on the individual are not consistent. Felix mentioned that the highest incidence of some types of mental disorder, and of suicide, crime, and other forms of abnormal behaviour, has been found in areas where community life is disorganised, the population fluctuating, and the individual lonely and anonymous.

These various studies have been scattered and disjointed. Felix suggested that planned socio-clinical inquiries should now be made of various types of mentally disordered people, and that these should include the clinical history of every member of the family, and an analysis of family relationships, and of the relations of the family, and of members of the family, to the community. Studies should also be made of individuals, following their history from the time of their parents' marriage, through childhood to adolescence; and again the family relationships should be taken into account. Personality structure and breakdown should be examined in various cultural groups, and the data collected by psychiatrists and by pædiatricians, and by pædiatric clinics, should be analysed. The effect of abrupt changes in people's lives should also be investigated—changes produced by placement in a foster home, unemployment, incapacity, divorce, imprisonment, or death of the family head. Finally laboratory studies are needed of such experiences and mechanisms as frustration, repression, and the various substitutive processes. It seems a wide programme, but the material is there to everybody's hand, and these Americans are gluttons for work.

1. Coming of Age in Samoa. New York, 1928.

SUFFOCATION BY MILK FEEDS

CORONERS, like others who make public pronouncements, are in an unfortunate position in that the compression necessary when their remarks appear in the popular press may result in misleading generalisations. Thus, the recent reports headed "Babies Killed by Lumps in Dried Milk" must have caused anxiety to thousands of mothers. Suffocation after vomiting in babies is no new disaster. Weakly babies, mental defectives, and those with malformations such as cleft palate are particularly liable to inhale food material. Lipoid pneumonia, which can be regarded as the long-term equivalent of the acute emergency, can be caused by milk, even breast-milk, as well as by cod-liver oil and oils used for nasal drops. Milk in the respiratory tract, whether in lumps or not, is likely to cause trouble of varying degree. The correct method of preparing and administering dried-milk mixtures may not always be understood by the less intelligent mothers. The powder should be mixed into a paste with cold water and then the required amount of water added—boiled and hot but not boiling. During the feed the bottle should be shaken from time to time to prevent the fat globules from collecting at the top of the contents. The teat should be removed from the baby's mouth several times during the feed to enable the baby to bring up wind, and to let air into the bottle, if it is of the single-ended type. These precautions will help to reduce the chance of vomiting after the feed. The teat should be as big as possible so that the baby so to speak mouths it rather than sucks it. The hole should be of a size that permits the feed to be taken in 15–20 minutes.

It seems curious that lumps in the milk small enough to get through the teat should cause either vomiting or more trouble if inhaled than plain reconstituted milk. Anxious mothers often speak of vomits as containing curds, and yet any milk which has been in contact with the gastric secretions should be curdy. To this extent "lumps" in a vomit after a milk feed can scarcely be regarded as abnormal. To attribute the formation of such curds to any particular brand or variety of dried milk is probably unfair. Dried milk is the commonest alternative to breast-milk, and if babies are suffocated after bottle-feeding it will probably be found that they were taking a popular variety of dried milk. One report mentioned national dried milk in this connexion, but it would not be right to assume that therefore this particular variety of milk is at fault. It may be that the babies concerned were not being fed by bottle but by spoon, which would suggest either that they were abnormal babies or that dried-milk feeding was being unusually prolonged. The brief press reports leave such questions unanswered. Medical experts, according to one report, are being asked to investigate the whole situation. It is to be hoped that their pronouncements will be made public, for there does seem to have been a considerable increase in the deaths from milk suffocation—in the country as a whole the annual number is said to have increased threefold in 10 years. Nevertheless, without much stronger evidence it would be a great pity if the idea gained ground that national dried milk is peculiarly dangerous.

THE first World Health Assembly is to be held in Geneva in June.

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Parliament

NATIONAL HEALTH SERVICE

Debate in the Commons

ON Feb. 9 in the House of Commons Mr. ANEURIN BEVAN, Minister of Health, moved:

> That this House takes note that the appointed day for the National Health Service has been fixed for July 5; welcomes the coming into force on that date of this measure which offers to all sections of the community comprehensive medical care and treatment and lays for the first time a sound foundation for the health of the people; and is satisfied that the conditions under which all the professions concerned are invited to participate are generous and fully in accord with their traditional freedom and dignity.

It was significant, he suggested, that the debate had been requested by Labour members of the House and not by the Opposition. For the last six months there had been a sustained propaganda in Conservative newspapers gravely misrepresenting the nature of the health service, and the conditions under which the medical profession were asked to enter the service. There had been even worse misrepresentation, sustained by a campaign of personal abuse, from a small body of spokesmen who had consistently misrepresented the great profession to which they were supposed to belong. He made a distinction between the hard-working doctors who had little time to give to these matters and this small body of raucous-voiced people. The doctors voting in the B.M.A. plebiscite were doing so under a complete misapprehension as to what the health service was. It had been frightening to speak to some doctors and to learn the extent to which their representatives had failed to inform them about the facts.

It had been suggested, Mr. Bevan continued, that one reason why the medical profession were so stirred was the personal deficiencies of the Minister. Absence of introspection was not a part of Celtic equipment, and he was very conscious of his own deficiencies; but he was reassured by the fact that it had never yet proved possible to appoint a Minister of Health with whom the British Medical Association agreed. Lloyd George was a Liberal, and they found him anathema; Mr. Ernest Brown a Liberal National, and they had found him abominable; Mr. Willink a Conservative, and they had found him intolerable; and now they had found the present Minister even more impossible. He felt therefore that the House could dismiss at once suggestions that the disagreements with the medical profession were the consequences of the personal qualifications or disqualifications of the Minister concerned.

It had also been suggested by the B.M.A. that the Government had not negotiated with them sufficiently. But there had been long negotiations with Mr. Ernest Brown, and Mr. Willink, and on every occasion the B.M.A. rejected the advances made. Mr. Bevan himself had met the Negotiating Committee 8 times—3 times most irregularly while the Bill was in committee—and since August, 1945, his officials had met representatives of the Negotiating Committee 28 times. There had been continuous discussions, but the Negotiating Committee was never in a position to negotiate. It had received at its own request instructions not to negotiate. When he met the committee last December he was presented with a printed circular rejecting the Act before the final negotiations had taken place. He had then asked the chairman what was the use of two days' discussion when one of the parties had already decided to reject the chief features. The answer was that they had already made up their minds.

They were not now dealing with a body seeking to modify principles in the legitimate interests of the medical profession; they were dealing with a body organising wholesale resistance to the implementation of an Act of Parliament. They had already rejected the Act before they knew the terms of remuneration to the practitioner. The whole thing began to look more like a squalid political conspiracy than the representations of an honourable and learned profession. One of the weaknesses of the B.M.A. position was that they had mustered their forces by misrepresentation; when the facts were known their forces would disperse.

THE FOUR ISSUES

The first of the four main issues on which the B.M.A. took their stand was the abolition of the sale and purchase of practices, which, Mr. Bevan pointed out, had been recommended by the profession's own health commission. The doctors had voted for it in their own plebiscite; all the Government had done was to put into the Act the recommendations of the best medical opinion. The Government regarded it as inconsistent with a civilised community and a reasonable health service for patients to be bought and sold. That existed in no other country, and was a blot on our medical system. Did the Opposition, he asked, accept or reject the sale of practices in the public service? One of the main reasons for having the debate, he added, was that the Opposition as well as the Government should have the opportunity of making their position clear. So far as the Government were concerned, there could not be any question that a reputable health service must not retain the buying and selling of practices.

The B.M.A.'s second objection was to the basic salary. The Coalition Government in 1943, Mr. Bevan recalled, had proposed a full-time salaried general-practitioner service. This proposal he had himself rejected as he thought it contained too much of the element of regimentation. But during the passage of the Bill he had made it clear that young doctors ought to have the opportunity of living decently while they were building up their practices. The Government wished not only to relieve patients of financial anxiety but also to relieve the doctor of financial anxiety when he approached his patients. If a practitioner found the basic salary repugnant and considered that it made him into a State-salaried servant he need not take it. But it would be interesting to see how many general practitioners would find it so dishonourable to the traditions of the profession that they would hand it back as though it were poison. To have two capitation fees running simultaneously in the service would, Mr. Bevan affirmed, be too complicated when its effect on the national and local pool available for the payment of general practitioners was considered; because one of the concessions made, which had not been italicised, was that for the first two years a sum covering 95% of the population would be paid into the pool. The doctors would therefore be assumed to be at risk for a large number of people who would not have signed their lists at all.

Their third argument was that the partnership agreements would be rendered difficult, and there was a natural anxiety among general practitioners on this point. To try and clear it up he had decided, with the concurrence of the Attorney-General and the Lord Chancellor, to appoint a legal committee to inquire into it. That was a most unusual proceeding, for as a general rule after Parliament had passed a Bill it was left for the courts to construe it. However, if legal minds could find any way in which this clause could be clarified, he was perfectly prepared to have an amending Bill to make it clear where the general practitioner stood.

The B.M.A.'s fourth objection was the removal of what they considered their legal rights. Here misrepresentation, Mr. Bevan declared, had reached staggering proportions. It had been said that the doctor had had taken

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away from him his right of appeal against unlawful dismissal. That was entirely untrue. The doctor would have exactly the same right of appeal to the court against unlawful dismissal as any other citizen. During the whole of his negotiations with the representatives of the medical profession they had never been able to show any part of the Act which took away those rights. But some of them wanted to go further, and wanted the right of appeal against removal from the service on the ground of misconduct or neglect. If a doctor was to have the right to ask the courts to arbitrate not on a question of law but of merits, how could that be denied to anyone else?

The existing protection for the doctor under the National Health Insurance Acts was merely an appeal to the Minister, and Mr. Bevan had decided that that was not sufficient, as the new service would be universal and removal from it would carry heavier penalties. Therefore he had put in a tribunal between the local executive council and the Minister. Under the new scheme the general practitioner was in contract with the local executive council—on which there were seven representatives elected by the doctors in the locality. If that body decided he should be removed, they reported to the Minister. All the Minister could then do was to refer the matter to the tribunal, consisting of a chairman appointed by the Lord Chancellor, a doctor, and a layman. If the tribunal decided the doctor should be retained the Minister could do nothing about it. The Minister was only brought into the picture if the doctor himself invoked the Minister against the decision of the tribunal. The Minister could then order another inquiry, public or private as the doctor desired, with witnesses if need be, and with all the apparatus of full investigation, and the Minister could then decide whether the doctor's contention should be upheld or not. There was no professional body in the world for which greater protection existed than that. In fact Mr. Bevan was beginning to wonder whether the public was sufficiently protected. Supposing the doctors were given a right of appeal to the courts, which the Government held to be constitutionally impracticable, what a weapon of tyranny that would put into the hands of the Minister. Not only the doctor but the Minister too would have the right of appeal, and could go to the court for the removal of a doctor. Any Minister would have a considerable power of intimidation over the doctor, whom he could force to undergo all the odium of publicity, and of having his professional reputation besmirched. If the medical profession could be given what they were asking for, in six months' time they would be cursing the people who asked for it.

WHAT THE ACT OFFERS

He was desperately anxious, Mr. Bevan continued, to get the medical profession into the scheme enthusiastically and harmoniously, and he deplored the atmosphere which had been created in the last six months. To avoid polemics he had made no public speech until January, when the B.M.A. decided to reject the Act, and it might be that the mis-education of the doctors was therefore partly his responsibility. If he had not left their education solely to those who were supposed to speak on their behalf they might now know a little more than they do about the Act. But if he was to be asked now to make some concession to assuage the feeling and bring about greater harmony between the Government and the doctors, he must point out that the negotiations had been a long series of concessions on the part of the Government and of none by the medical profession. They had accorded paid beds to specialists where they could charge fees, with a limited number of beds where the fees would have no ceiling. They had conceded that general practitioners and specialists could have private patients.

He reminded the Opposition that not only the working-class but also the middle class would benefit from the new service. The Act was therefore vital, not only for the physical health of the community but in the interests of all social groups. He deplored talk of private practice as the glory of the profession; what should be the glory of the profession was that a doctor should be able to meet his patients with no financial anxiety.

The Government, Mr. Bevan stated, were prepared to add to the motion the Opposition's amendment that the House—

> "declines to prejudice in any way the right of individuals in all the professions concerned to express their opinions freely, according to their traditions; and in the interest of their patients, upon the terms and conditions of service under the proposed National Health Scheme."

A more innocuous collection of bromides he had never seen. Its sting was that it left out the last part of the motion. If the Opposition considered there was nothing in the Act which interfered with the freedom of choice, nothing which prejudiced the doctor-patient relationship, they should say so. So far they had not. The Government, Mr. Bevan pointed out, did not object to the doctors expressing their opinions freely, nor to the B.M.A. recommending their members not to take service under the scheme. But they did take objection to organised sabotage of an Act of Parliament. Did the Opposition support the B.M.A. organising resistance on July 5? The beginning of that road might look attractive, but the end would be exceedingly unpleasant.

If there was one thing the House must assert it was the sovereignty of Parliament over any section of the community. B.M.A. House had not yet been made into another revising chamber. But any section of the community had the right to try and persuade the House to change its mind. The Government took up the position that the B.M.A. had exceeded their just limitations, and that the best thing they could do now was to put on record their opinion that while they might disagree with the Act in this or that particular, or in general if they wished, nevertheless they would loyally accept the decision of Parliament and continue to agitate for such revision as they thought proper.

He had hoped that this great Act would have excited the medical profession, that they would have realised we were setting our feet on a new path, and that we ought to take pride that despite our difficulties we had put the welfare of the sick in front of every other consideration. He asked the House to tell the British Medical Association that we looked forward to starting the Act on July 5 and that we "expect the medical profession to take their proper part in it because we are satisfied that there is nothing in it that any doctor should be otherwise than proud to acknowledge."

A MATTER OF CONSCIENCE

Mr. R. A. BUTLER felt that Mr. Bevan's bedside manner had done little to make a settlement of the dispute any more likely. The issue before the House was how to reconcile the conscience and convictions of doctors as to the manner in which they felt able to conduct their professional duties with the needs of a national health service which the vast majority of doctors wished to serve. It was not a private wrangle between the Minister and a score of elderly doctors or some raucous-voiced people. Doctors, dentists, and the optical profession were all concerned, and anxieties were rising.

The point of the Opposition amendment, Mr. Butler continued, was that the debate should not be used as a means of intimidating the doctors in the middle of their voting, and that they should be given an opportunity of expressing their views freely. The Opposition also felt that the Minister's words, "that the condition under

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which all the professions concerned are invited to participate," were not in accord with the dignity of the professions, and they therefore felt obliged to insert a safeguard for the doctors during the period of their voting. He did not dispute the word "generous," but the financial terms were not what was really at stake in this controversy. He wished to make it clear that if the doctors came into the scheme it would not be due solely to money inducement; and if they stayed out it would be due to conscience.

The Opposition regarded the Act as part of the new social mosaic. The doctors were a vital element in the scheme, which could not be worked without the willing coöperation of all concerned. The Minister was misleading the country, because the date was approaching for the introduction of the scheme, and he had not yet secured the coöperation of the medical profession.

This drift was another example of the irresponsible and incompetent administration associated with the Government, and the responsibility for the grave danger in which the health scheme now stood lay at the door of the Minister of Health. The whole stage was ready and set for this reform, and the only person who was unready and unset was the Minister.

"SABOTAGE"

One of the main points of the Minister's speech had been the sovereignty of Parliament. Did the Minister feel that the doctors were sabotaging Parliament by expressing their opinions?

Mr. BEVAN interposed to say that it was not the doctors but the B.M.A. he had arraigned. The B.M.A. were sabotaging the Act by organising collective abstention from participation.

Mr. BUTLER retorted that collective sabotage was an even stronger term. The doctors had been given by the Act an opportunity to state their views, and the Minister must know that unless he obtained their coöperation the scheme would not work. The Chancellor of the Exchequer had recently said that some groups of people seemed to think they could overrule the decisions of the nation. But the nation had decided that there should be a National Health Service and that doctors should be free to come in. Mr. Butler was driven to the conclusion that in this dispute the doctors must agree to the terms and conditions and that the Act gave them the opportunity to do so.

The doctors, he continued, would suffer more than the general public whatever happened in this controversy, because they would not withhold their work, and, so far as he could see, with the introduction of the National Health scheme they might have to work for nothing because the public would already be paying 10*d.* on the new stamp.

BASIC ANXIETIES

The first principle on which the doctors rested their case was that they must be free to practise according to their accepted standards. They wanted freedom of professional judgment, speech, and action, and also freedom to write and publish. He understood from a recent answer by the Minister that a doctor would be able to write and publish in scientific journals what he liked without any prohibition whatever.

The second principle on which the doctors insisted was that medicine should not become directly or indirectly a full-time service of the State. The real anxiety of the doctors was that the Minister had power in the regulations to extend the basic salary and make it eventually the main feature of the service.

Mr. BEVAN intervened to say that at the second reading he had stated that it was the intention of the Government to pay the general practitioner mainly by way of a capitation fee and the rest by a small element of basic salary. He had repeated that in committee, and he repeated it again. There was no intention of extending it to make it a full-time salary.

Mr. BUTLER replied "so far so good"; but he added that to allay the apprehension of the medical profession the Minister would have to go further and remove the general basic element in all salaries. It was not the basic salary by itself which was causing alarm, but the fact that it might be extended, and members of the profession might by that door be brought into the State service. The doctor feared lest his status be changed into a Civil Servant, who in the words of Dr. F. M. R. Walshe "stands in a fugitive and impersonal relationship to individuals." Then the doctor's whole position in practising the art of medicine would be undermined. If the Minister could allay that apprehension he would have got one stage further.

The fear of "interference" covered the other points with which he wished to deal. The profession felt deeply on the question of negative direction. He believed that it was unnecessary. The final question was that of appeal, and here again he urged the Minister to think once more. He agreed with the Minister that it would be difficult for a court of law to decide upon matters which were done, wisely or unwisely, by a Minister. He also agreed that a court of law did not exist to decide upon conditions within a service.

But the Minister himself set up the tribunal, and Mr. Butler believed that the fear of the doctors was that there was an ultimate political chief at the top. Could Mr. Bevan not leave his elaborate system of the tribunals to decide those matters and simply allow an appeal on fact to the courts from the tribunal and omit the Minister as the final authority?

These, Mr. Butler said, were the main points. He would not press others, such as the sale of practices, which he regarded as settled. It was clear there was little that could not be settled by good will, toleration, and common sense. But they needed an approach which was broader than the party approach. They could not nationalise conscience. Mr. Bevan would not get agreement unless he got the confidence of the profession. It was important that the health scheme should work by agreement and not by coercion. Mr. Butler thought the doctors could be gained and that an extra effort should be made to meet their basic anxieties. Health was not a matter for personal or party triumph. What was wanted was a victory of common sense.

SOME MISUNDERSTANDINGS

Dr. S. JEGER confessed he had never been able to see how the Act interfered in any way with the relationship between doctor and patient. If there was any interference he would be the first to object. The doctor's responsibility for and to his patients would be no less under the Act than it had been in the past. In the new service he would get greater representation on his local executive council than he had ever had in administration of medical work.

If ever there was a bewildered profession, Dr. S. TAYLOR declared, it was the medical profession at the moment. The spokesmen of the B.M.A. had spoken in passionate terms, but the burden of the message ranged from emotional condemnation of the whole Act to admissions that much of the Act was good, except for four or five details. When doctors spoke about becoming Civil Servants, he continued, they did so in all sincerity, but in complete ignorance that the Act specifically provided that this will not be so. On the question of appeal to the High Court there was a basis of reason—even if distorted reason—behind the medical attitude. Doctors were familiar with only one statutory tribunal—the General Medical Council. On the whole the G.M.C. did its work admirably, but when on rare occasions things did go wrong every libertarian doctor's

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hair bristled. These occasions were distorted by practitioners. If they had experience of Ministry of Pensions tribunals their attitude would be different. They seemed unaware that for 36 years they had conducted their panel services with far fewer safeguards than they have under the new Act.

There was also immense misunderstanding about negative direction. The power vested in the Medical Practices Committee was simply to prevent the establishment of new public practices in over-doctored areas. The new system, Dr. Taylor maintained, would give the doctor greater freedom of movement than in the past, as he no longer need sell and buy a practice if he wished to move. Two safeguards he wished to see inserted in the regulations was the compulsory advertisement of all vacancies in medical practice and the regular publication of the extent of the over-doctored areas.

There was nothing inherently Socialist in payment by salary, Dr. Taylor declared, nor inherently un-Socialist in payment by capitation fees. It was a question of the most efficient way of working the organisation. The case for paying a basic salary in under-doctored areas and to the young doctor was recognised. There was also a case for paying it to the older doctor who wanted to cut down his work a little. There was a case for paying it to anybody who wanted to have a basic salary, and after all the majority of the profession had voted for it in their original plebiscite. He suggested that to avoid administrative complications doctors who did not wish to take the basic salary should have it paid into their superannuation fund.

TRADITIONS AND STANDARDS

Mr. H. LINSTEAD regretted that the controversy between the Minister and the profession had assumed the shape of a gladiatorial contest. What was to be, in future, the relation between the great liberal professions and the State? Doubts about this new relationship lay at the root of the differences between the Minister and the doctors. Hitherto the professions had been able to lay down by their own disciplinary machinery their own professional standards. Hitherto each professional man had been free to work according to his own conscience and his own standard of professional skill. Rightly or wrongly the doctors feared that these traditions were going by the board. There was also a fear that doctors would lose the right to practise wherever they liked. The Minister would not get the good will of the medical profession until he convinced its members that old traditions of their profession would be respected.

If Mr. Bevan believed that he would be able to break the resistance of the doctors by means of the Government majority in the House of Commons, and by the power of the purse, it would be a dearly bought victory. He believed that the Minister was likely to find his greatest ally in building a first-class service in an independent medical profession.

Sir ERNEST GRAHAM-LITTLE said that what mattered was not what the Minister said but what was in the Act. Sir Ernest contended that for the effective fulfilment of the Act a larger provision of staff and of buildings must be forthcoming than was possible on the appointed day, or indeed in any near forseeable future. He thought attention should be directed to these practical considerations rather than to the buying and selling of practices. What assurance could the Minister give the House that on July 5 the medical staff would be adequate to implement the Act. He quoted voting figures to show that there was no evidence that consultants would accept service. The general-practitioner section, which was even more important, was authoritatively represented by the B.M.A. Its membership had jumped from 40,000 in 1940–42 to 54,000 this year. The increase was due to the resolve of the rank and file to resist a salaried medical service.

Turning to the provision of buildings, Sir Ernest pointed out that three weeks ago the Minister had announced that the provision of health centres must be postponed indefinitely on account of the building stringency. That made an enormous hole in the scheme, and it was clear that the provision of new hospital accommodation—perhaps even more urgently needed—was even more remote.

Mr. J. BAIRD was puzzled by the mass hysteria engendered in the medical profession during the last six months. Many doctors, he thought, were genuinely worried and were opposing the service through ignorance of the Act, resulting from the flood of propaganda to which they had been subjected. What was worrying the rank and file of the profession was not the sale or purchase of practices or the basic salary, but fear of being subjected to an unnecessary bureaucracy. Nothing could be further from the truth. No professions in the world were entrusted with more control of their own destiny than the medical and dental professions possessed under the new Act.

Mr. D. MCA. ECCLES pointed out that the Minister did not seem to worry much about the strength of the doctors' attachment to their traditions. But suppose a large majority of doctors preferred their professional traditions to the Minister's money? Then the Health Service, which in conciliatory hands might have been launched in an atmosphere of general good will, would get off to a prejudiced and embittered start. Mr. Eccles suggested that for a basic salary there might be substituted a guaranteed minimum.

Mr. W. D. GRIFFITHS said that whatever the result of the B.M.A. plebiscite he believed the people of the country wanted the Act. The average man and woman would never be persuaded there was anything intrinsically immoral about having a basic salary, when they fought all their lives to get one.

Mr. SOMERVILLE HASTINGS said that many doctors, who had been doing excellent work all their lives, were certain that their patients had been well treated, and they did not realise that there were many other patients who because of lack of organisation had not been getting such good treatment. These doctors were trusted, and on medical matters their word was rightly regarded as law by their patients. They felt that their patients should also take their word as gospel as regards the organisation of the health services. But the good doctor was not always a good administrator, and often one got a more useful opinion from a layman on this subject. Again the doctor was apt to discredit ordinary newspapers, because the reports of new treatments in them were almost invariably wrong, and to believe what he read in the medical press. But when the medical press switched from scientific truth to political matters, the doctor failed to realise the change and took at face value everything written in these journals.

Mr. Hastings suggested that if the name basic salary was distasteful to the profession it should be changed to "settlement allowance," or even take the form of a guarantee of the first 300 or 400 patients.

Speaking as a teacher of medical students, Sir JOHN GRAHAM KERR feared that the threat of a salaried profession would bar the very best young men from medicine. Yet it was these able young men, with a good conceit of themselves and confidence in their ability to get on, who became the leaders of their profession.

LAST WORDS

Mr. R. K. LAW, in winding up for the Opposition, expressed the regret of his party that the debate should have been held while the medical profession were making up their minds on these issues. If the doctors did decide

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to stay out of the service they would undoubtedly be accepting a financial risk, and it obviously would be wrong for any Member of the House to try to egg them on. But he believed that the doctors had the right to a freedom of choice which Parliament had guaranteed to them.

He urged the Minister even now to seek some accommodation with the profession. The doctors attached more importance to the capitation fee within the context of the Act than they did before. If the Minister would give way on one of the points at issue he might find he had broken the log jam.

Mr. A. WOODBURN, Secretary of State for Scotland, said he came into the negotiations late in their progress with an objective mind. He had seen no indications that the B.M.A. and their associates were prepared to work the scheme: they seemed more keen to have a fight than to get a settlement. There was no question that the doctor had the conscientious right to stay out of the service. But it was not within the bounds of liberty to say "I shall conspire with the B.M.A. to prevent the scheme being inaugurated." The B.M.A. case varied at every stage of the negotiations; when a concession was made on one point they went on to a new one.

The Beveridge report which gave birth to this scheme had thrilled not only the country but the world. The social security adumbrated in that report was now on the statute-book—family allowances, school feeding, adequate benefits for the maimed, sick, and ageing—and the abolition of the poor-law was on the way. July 5 was the V-day when we were to attack the five great social evils. Everyone—civil servants, teachers, local authorities—were striving to be ready to introduce this great scheme, with one exception, the British Medical Association. The purpose of the debate was not to force injustice on the medical profession but to make clear that doctors are being asked to injure, at its birth, the greatest health service in the world, on the basis of unfounded, specious, and unreal fears. On the other side, there was service to health and healing, security for the doctor and his wife, unfettered opportunity for specialist coöperation in treatment of patients. Let the House, he ended, make a unanimous appeal to the doctors to come in with good feeling and generosity and work this scheme as it was meant to be worked by the great spirits which gave it its initiation.

The closure of the debate was moved and was carried by 341 votes to 177. The amendment was then negatived by 337 votes to 178.

QUESTION TIME

To Implement the Acts

Viscountess DAVIDSON asked the Prime Minister, in view of the responsibilities which had been undertaken by the Government, under the Education Act, the Health Act, the Children Bill and the Criminal Justice Bill, now under discussion, what steps the Ministries of Health and Education and the Home Office were taking to secure the training at universities and other teaching centres of adequate personnel to work the Acts.—Mr. C. ATTLEE replied: The considerable expansion in the capacity of universities, which has already taken place and will continue in the future, is designed to secure an adequate supply of graduates in various fields of employment, including the public services. Measures have also been taken for increasing training facilities, for example, through the emergency training scheme for teachers and the Ministry of Health's scheme for postgraduate medical, including specialist, education and courses for training nurses, sanitary inspectors, physiotherapy teachers, and remedial gymnasts. Special courses at universities and other centres are available for child-care workers and probation officers, and it is intended to arrange other courses later.

Patients' Rations

Mr. F. MESSER asked the Minister of Food if he was aware that Service patients at the Harefield County Hospital received a meat ration valued at 2*s.* 9*d.* per week, but civilian patients were restricted to a meat ration of 1*s.*; and in view of the need for building up resistance to tuberculosis, would he arrange for civilian hospital patients to be granted a meat ration more in accordance with that provided for Service patients.—Mr. J. STRACHEY replied: I am looking into the whole question of the ration scale allowances for Service and civilian patients in hospitals.

Students' Rations

In a written answer Mr. STRACHEY announced that following the practice adopted with residential schools, resident students in colleges, hostels, and hospitals, including student nurses, would in future receive the equivalent of 5 extra main meals per head per week.

Distribution of Tuberculin-tested Milk

Sir JOHN MELLOR asked the Minister why consumers who were obtaining pasteurised milk were not permitted to change their retailers in order to obtain tuberculin-tested milk, even when their applications were supported by their family doctors.—Mr. STRACHEY replied: Our medical advisers have recommended that there are not general medical reasons for allowing a change of retailer in order to enable a consumer to obtain tuberculin-tested instead of pasteurised milk. Nevertheless they have always been willing to consider requests based on exceptional medical needs.

Sir J. MELLOR: Where the family doctor recommends a change, why should those cases be referred to the Ministry's medical advisers who have never seen the patient? Does not the family doctor know best?—Mr. STRACHEY: They are willing to take an exceptional case, but they firmly take the view that there is no general prima-facie case for change on medical grounds.

Mr. R. ASSHETON: Could the Minister tell us why this very generally desirable change could not be made in any event? What is the objection to allowing such changes?—Mr. STRACHEY: It is the difficulty of changing the retail milk supplies. That is a wider question, which I am considering at the moment.

Consultants and National Health Service

Wing-Commander N. J. HULBERT asked the Minister of Health if his attention had been drawn to the fact that medical consultants and specialists, at a meeting at the headquarters of the British Medical Association on Jan. 27, rejected his proposals for a National Health Service by 766 votes to 11; and what action he proposed to take to make the scheme acceptable to the medical profession.—Mr. BEVAN replied: Yes. I think that if professional men and women were allowed, at these organised meetings of this kind, a little enlightenment as to the true facts of the new scheme, they would certainly find it acceptable to them.

Payment for Published Works

Colonel M. STODDART-SCOTT asked the Minister if he would give an assurance that the doctors and dentists who entered the National Health Service and who published scientific or clinical articles and books would be permitted to retain fees and royalties that their writings earn.—Mr. BEVAN replied: Both professions will in this respect be in the same position as they are now.

Incidence of Poliomyelitis

Colonel STODDART-SCOTT asked the Minister how many cases of infantile paralysis were notified in 1947 and in how many cases was the diagnosis confirmed; how did this epidemic compare with any previous one; and if he was expecting a similar epidemic this year.—Mr. BEVAN replied: In 1947 primary notifications in England and Wales numbered 9199. Corrections in diagnosis are expected to reduce this figure to about 7350. The previous highest figure since 1912, when notification became compulsory, was 1585 in 1938. I cannot prophesy about future incidence.

Pneumoconiosis and Silicosis

Replying to a question, Mr. T. STEELE stated that 3724 certificates of disablement or suspension on account of pneumoconiosis were issued by the Silicosis Medical Board to coalminers during 1947.

Rehabilitation of Disabled

Replying to a question, Mr. G. ISAACS stated that since the vocational training scheme had started in 1941, 26,740 disabled people had been trained, of whom 23,854 were placed by his department in the trade for which they had been trained. Of the balance of 2886 many were placed in other trades or found employment for themselves.

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In England Now

A Running Commentary by Peripatetic Correspondents

I FOUND this letter on my table for "censoring" one morning. The patient had been admitted the night before, and he was, I need hardly say, immediately discharged to his unit.

Dear Mum,—Well, Mum, I really dont know what to say in this letter because I have got myself in a terrible mess of trouble, as you know already mum that i was on leave in London there is know need to explain that, well anyway I was in London on Saturday night, for my leave is from the 1st to the 5th and I got pretty well drunk and was walking along beside a pond and a policeman came along and asked me what I was doing and I told him I was just going to have a sleep as I was stranded and had nowhere to sleep, and he said come on jock tell me the truth and I'll let you away but I said to him, I am telling you the truth and he said you are sure you werent going to jump in the pond and drowned yourself and I said I was blinking well sure I was'nt, and I asked him what made him think that, he said well, its the first time I have seen anyone walking along the side of a pond at this time of the night and I had a good idea of what you are up to. Well I then told him that he was wrong this time and I made to walk away from him and he said I am not letting you move from here until you tell the truth, well I told him I was telling the truth, and he said come on give in to it and I'll let you go away without saying a word about it, so I thought to myself, well if I can get rid off him I just might as well say I was going to jump, to get away from him, so I said I was going to jump, and I was just going to walk away from him as I was wanting something to eat, but he said I am taking you in, so he took me to the police station, they then sent for an ambulance, and brought me to this place which is a nut house but dont you get worried about me because there is definately nothing wrong with me because if their was the doctor would not have told me that I was going out in a couple of days, I will be back in my unit in a couple of days, so please dont worry about me, I'm telling you Mum it was only the drink and nothing else that got me in here, so keep your chin up Mum.—Your loving son, — —.

* * *

Your peripatetic correspondent, your mundivagrant gentleman of the press, your gad-about scribbler (all according to Roget) attended some time ago a lecture on Immunisation. On reaching the hall he found ten or twelve earnest grey-haired women and one or two equally earnest black-haired bespectacled ones, while dotted here and there were occasional apologetic-looking (elderly) or profoundly studious (young) males. At the doorway three or four officials anxiously debated whether the Man from *The Lancet* had arrived, or would arrive, and whether the meeting ought to begin before he did. Their doubts were terminated by the entrance of the dowager (a familiar figure in philanthropic and such-like gatherings), after which, like leaves behind a bus, swirled a dozen followers. One of these—bald, bowed, and bewildered—was duly introduced as the professor, come to spread his gospel to new audiences. A martyr to science he was, said the dowager; one who had offered his writings to every scientific journal in the world but had had them invariably returned.

As the speaker had no English, an interpreter had to be employed, and the wisdom which the editors had rejected was heard only at second hand. Bacteria, said the professor casually, do not exist. Normal tissue consists of microboids and organoids. The former are small round bodies, and the latter shaped like dumb-bells, highly elastic and with the power of adhering to each other at their ends. The professor could not understand why he was the only person from the days of Pasteur who had described these formations, for they could be plainly seen under the microscope. Disease, he said, arises from the disarrangement of the dumb-bell-microboid relationship. Too many microboids mean boils and blains. Too many dumb-bells result in tuberculosis and cancer, and it is not only against your own organoids you have to be on guard—those from other animals or plants also are dangerous. Most infectious diseases arise from an organoid-microboid upset in cereals, and this year's measles is due to last year's rain. Cooking farinaceous food at 120°C is the only safeguard.

Your correspondent had been somewhat early for the meeting, and, with only the slightest detour, had found five pubs between the tube station and the hall, and only the last visited boasted a sandwich as well as the beer. But he realised (perhaps a little tardily) that this was science as he knew it not and medicine incompatible with that discussed at the meetings of the Royal Society of Medicine.

Even the audience was shaken by the professor's ideas. Surely, said a dear old lady in the next seat, you can catch measles from your little nephew if you kiss him when he has the rash? But the oracle was sure that measles was not infectious. What about the pasteurrisation of mulk, asked a bearded Scot. A useless procedure was the reply; to make it safe from cow's organoids it should be boiled at 120°C (there was no explanation of how to prevent it boiling over). What can we eat if bread is unsafe?, asked another. And the whole audience eagerly awaited the answer, for they were worried. First the bacon cut to one ounce a week—this was when potatoes were still being eaten twice daily—and now bread and cereals a danger to health! Eat legumes, was the answer. The dowager was aware of the anxiety: to hear that vaccines were useless was good; to hear that bread was equally dangerous was going too far. She thanked the interpreter for the fine job he had done; touched lightly on the professor's efforts; suggested that we were fearfully and wonderfully made and that we should not inquire too far into the reasons for many things; hinted (broadly) at a liberal donation on retiring; and closed the meeting.

* * *

In these days of priorities for motor-cars I find that my colleagues do much better than I. Nearly all my consultant friends in this region where motor-cars are made have obtained at least one new car in the past year, while I go soldiering on with my pre-war model. The radiologist gets a new car after he has taken serial films of the gastro-intestinal tract of the managing director. The obstetrician gets a new one when he has delivered the wife of the chairman of the company. The physician gets his after treating the director for dyspepsia. The E.N.T. man gets one for taking a throat swab from the distributor; I take over the hunt for hæmolytic streps in this swab, but apparently that doesn't count. Must I promise to do a complete necropsy on the chairman of the shop-steward's committee before I get my new car—long since ordered in the proper manner—since I am only a pathologist?

* * *

A general, a high official of a neighbouring friendly power, visited my clinic this afternoon while on a tour of inspection. I was not expecting this honour, and His Excellency surprised me sitting at my desk, pipe in mouth, dressed in a green check shirt and brown corduroys, pounding away at my typewriter. So utterly disreputable did I appear, in contrast to the many extremely smart plain-clothed and uniformed officials who accompanied him, that he, knowing the English to be mad, immediately assumed that I must be a very important person indeed. He advanced with a broad smile, bowed, scraped, and acted generally in a most conciliatory fashion. Then he noticed the bottles ranged about the room and his expression became puzzled. An interpreter leaned forward and said: "Ee sang, ee sang" (doctor, doctor). Immediately all happiness fled from the general's face. He snapped about turn and strode from the room, the confused officials taking up belated chase. Ee sangs are pretty small fry in his part of the world.

* * *

Notice outside a clinic housed in a government building full of bureaux of this and that: BUREAU OF INTERNAL AFFAIRS.

* * *

Try this as a loosener-up first thing on Monday mornings:

"*The Sheep Scab (Amendment) Order of 1948.*—Provides that where, under any Order of the Minister or Regulation of a Local Authority relating to sheep scab or sheep dipping, a double-dipping of sheep is required, a single dip in a 'Single-Dipping' type sheep dip will suffice."

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Special Articles

DENTISTS AND THE ACT

MINISTER AND THE BRITISH DENTAL ASSOCIATION

AFTER a meeting of its representative board on Jan. 31, the British Dental Association issued a statement saying that for many years it has advocated a dental health service available to all who need it, and that it has given the Ministry of Health its expert advice on the best way to provide such a service. The Minister was requested to embody in the National Health Service Act and its regulations certain fundamental principles which are described as follows:

PRINCIPLES

Clinical Freedom

In private practice, so long established as a highly successful service for the public which it serves and, indeed, providing by far the greater part of the dental treatment given in this country, a dental practitioner is free to give what he considers, in his professional judgment, to be the best possible treatment to each individual patient, subject only to two conditions: (*a*) that the patient consents to the treatment; (*b*) that the fee is acceptable to both parties—i.e., a fee that the patient considers reasonable and within his means and that the dentist is content to accept as a fair and just reward for his skill and services. In private practice, the dentist has complete clinical freedom, with no restriction upon his initiative and enterprise. He is free to use whatever methods and materials he thinks are in the best interests of his patient.

The proposed regulations of the Act confine clinical freedom to certain items of conservative treatment (e.g., fillings of a standard type), but for the great majority of his patients the practitioner would have to fill in a form of estimate for the necessary treatment and submit this for approval to a board, the Dental Estimates Board, before being able to commence treatment. In addition, all patients would be contractually liable to attend for examination by a State dental officer before treatment in order to confirm the clinical judgment of the dentist and after treatment to confirm the standard and completion of the work.

The association holds the view that this curtailment of the clinical freedom of a dentist will operate to the detriment of the standard of treatment given.

Patient-Practitioner Relationship

The whole basis of successful dental service lies in the mutual confidence and respect of patient and practitioner. Nothing can be acceptable to the association which weakens this relationship. In the Health Service, however, the dentist, once the sole guardian of the patient's interests, is primarily in contract with a State-appointed executive council, and his relationship with his patient will take second place.

Method of Remuneration

The method proposed by the Ministry is by means of a nationally established fixed scale of fees. For each item of treatment there will be a fixed fee for every practitioner in the land, quite irrespective of the degree of skill, ability, experience, and effort he exhibits in his work, of the amenities and surroundings he provides in his practice or of the standard of efficiency and wages of his staff. Under no conditions will a practitioner be able to receive an extra reward for any additional professional attribute he may possess. His patient will not be permitted to suggest that he would like to have "something better than panel." The patient must be content with the standard of utility dentistry which will be provided by this method of remuneration.

The association has asked for a system of remuneration by "grant-in-aid." This means that the Government grant for each item of treatment would be available to the patient whether he attends a practitioner willing to work at the standard scale fee, or a practitioner whose standards, skill, experience and amenities enable him to provide "something better than panel" and therefore entitle him to receive a higher reward for his work. This system is in successful operation in the social-security schemes in France, Belgium, and Norway and provision for it has recently been made in the Health Service for Northern Ireland.

The fixed scale can only result in a standardised service for all, for the good dentist will be unable to afford to maintain his higher standards of service at his own expense. The most careful and conscientious dentist will earn the least.

Æsthetic Values

The association maintains that there is no indication that, in the Health Service, proper recognition will be given to the æsthetic side. The proposed continuation of certain conditions of present dental benefit, such as restriction to certain types of filling material in certain teeth, restriction of the methods and materials necessary to construct artistic dentures to improve the appearance of the patient, lead to the conclusion that even if art in dentistry is not actively discouraged in the new service, it will very soon die out for lack of any incentive.

Clerical Work

The Health Service will introduce into the practices of most dentists as a new feature a quite unnecessary amount of form-filling and correspondence with third parties in relation to treatment of a patient, resulting in much irritation and loss of productive time.

It would appear to the association that this large increase in clerical work is only necessitated by the nature of the bureaucratic and statistical controls which are necessary to Government departments and will not in any way increase the quality or efficiency of the service to the patient. Indeed, it is more likely to operate in the opposite direction.

Discipline

The association maintains that the proposed disciplinary regulations substitute for the system of self-discipline and responsibility to the patient which is inherent in private practice, one which suggests that the integrity of the dental profession is not rated as highly by the Ministry as by patients in private practice.

The association is of the opinion that as many of the restrictive, narrowly defined disciplinary regulations as possible should be abandoned as unnecessary for a profession whose professional code of ethics and behaviour in private practice has gained a reputation in the public mind of integrity and trustworthiness.

At a meeting between the Dental Consultative Committee and the Minister of Health on Nov. 25, 1947, the above principles were put before the Minister by memorandum and word of mouth. "He failed to concede any single one of them to the profession."

THE B.D.A.'S VIEWS

The association maintains that a practitioner should have the right of final appeal to the High Court, and that, in view of the Minister's power to determine by regulation the conditions and terms of service of officers employed by any body constituted under the Act, there is under the Act no security for the practitioner.

The association is opposed to the idea of the general dental services under the Act being given solely by whole-time salaried dental officers in health centres; it regrets that responsibility for the most important section of the community—namely, the children—is shared between the Ministries of Health and Education; and it states that the inclusion of adolescents in the priority classes was refused by the Minister on account of an alleged shortage of dentists.

> "The Minister's attitude to many of the suggestions made by the association has been affected by his constant emphasis upon an alleged shortage of dentists. The association is of the view that, provided the conditions of service are attractive enough to bring into the service the full strength of the profession, there are sufficient dentists to meet any demand that is likely to take place in the immediate future of the National Health Service Act."

The representative board of the B.D.A. recommends all members of the association to refuse to enter

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the service " until the Act and its regulations are amended so as to include the principles advocated by the association." It adds that the association " is prepared, in the public interest, to maintain, with no sense of commitment, its contact and discussions with the Minister of Health in order that amendments may be obtained to the Health Service Act, 1946, and its regulations which would ensure a satisfactory dental service for the public."

The Minister's Statement

A memorandum sent to all dentists in England, Scotland, and Wales points out that any dentist can take part in the service or not. When his name has been placed on the dental list of the local executive council he can accept patients to whatever extent he chooses, while also retaining his right to private practice. Patients will not be required to register on the list of any particular dentist; they will have complete freedom of choice of dentist and will be free to consult a dentist outside the area in which they reside. A patient needing treatment will merely have to get in touch with the dentist in the same way as in private practice.

If he participates in the service the dentist will undertake to provide proper surgery and waiting-room accommodation and suitable equipment and instruments, to use proper skill and attention, and to seek to secure full dental fitness. This undertaking will apply to any patient whom the dentist may treat under the scheme, but he is in no way limited as to the number of patients he may see, nor is he obliged to accept any patient under the service.

Broadly speaking, treatment falls into two main divisions—that which may be carried out without any prior authority and that which requires the prior authority of the Dental Estimates Board. The Dental Consultative Committee have represented that dentists should not in general be obliged to obtain prior approval except for special and expensive forms of treatment; but the Minister feels bound to retain some interest in the cost and standard of the service and he believes that in the following arrangements control has been reduced to the minimum consistent with this principle.

1. *Treatment not Needing any Prior Authority.*—In this category is all normal conservative treatment—i.e., prophylaxis, fillings and root treatment, extractions for the relief of pain or extractions not necessitating replacement by dentures (including any necessary anæsthetic), ordinary denture repairs. X-ray examination for diagnosis and certain other treatment may likewise be carried out at once, subject to a limitation of cost which will be settled following the discussions on remuneration.

On the completion of treatment the patient and the dentist sign the estimate form, which is then sent to the Dental Estimates Board for authority for payment.

2. *Treatment Needing Prior Authority.*—In this category are the removal of teeth (otherwise than in (1) above), the provision of dentures, extensive and prolonged treatment of the gums, gold fillings, inlays, crowns, special appliances, and oral surgery.

With the approval of the Dental Estimates Board a patient will be able to pay the extra cost of certain more expensive treatment or appliances.

The Dental Consultative Committee have represented that applicants for dental treatment should be required to undergo the whole of the treatment needed to make them dentally fit—just as insured persons claiming dental benefit are at present required. The Minister, however, does not feel that it would be right to deprive a person who is unwilling to undergo full treatment of a service which is designed to be available to the whole community and which is provided at the expense of public funds. Where a patient is not willing to undergo the whole of the treatment necessary the dentist will carry out (or seek approval for) such treatment as his professional judgment suggests and the patient will allow.

The Dental Consultative Committee have pressed for a system of remuneration by way of grant in aid; but the Minister considers that this would run directly counter to the principle that full dental services under the National Health Service shall be free of charge, except for specially expensive treatment and appliances.

Recognising the difficulties which may arise in the provision of a service dependent upon a profession whose numbers may prove to be too small, the Act has placed on local health authorities the duty of making available, *as a priority*, dental advice and treatment for all expectant and nursing mothers and pre-school children (in addition to the arrangements made for school-children through the school health service). Patients will retain the right to obtain treatment under the general scheme, provided they can find a dentist who will accept them for the purpose.

CHEMOTHERAPY IN COURT

ADVANCES in chemotherapy with the sulphonamides were reviewed by Mr. Justice Jenkins in his recent judgment in favour of Boots Pure Drug Co. Ltd. in their petition for the revocation of the patent no. 533,495 granted to May & Baker Ltd. and Ciba Ltd. for an invention entitled " Manufacture of New Benzene Sulphonamido Derivatives." The hearing lasted 17 days and evidence was given by Sir Lionel Whitby and other authorities on chemotherapeutics. The patent includes the manufacture of sulphathiazole and the allied 4-methylthiazole, which is used in Continental countries; and, subject to any reversal by the Court of Appeal, these important chemicals may now be freely manufactured by anyone in Great Britain. The respondent companies' motion to amend their patent to apply only to these two compounds was refused because a specification as amended would be substantially different from the invention claimed.

Regarding the substitution products of sulphanilamide, His Lordship said that research appeared to have proceeded on empirical lines and had been largely a matter of guesswork, or trial and error. Heterocyclic substitution had been investigated first by the two respondent companies, and a paper on the value of sulphapyridine had been published by Sir Lionel Whitby in THE LANCET on May 28, 1938. In Swiss patents granted that year there was a reference to chemotherapeutic activity, and in no. 533,495 there was a statement that " the new *p*-aminobenzene-sulphonamido-thiazoles had chemotherapeutic activity in streptococci infections and similar illnesses." This was construed by the Judge as amounting to a suggestion that all substances produced by the method specified and from the materials should have chemotherapeutic properties. Evidence from chemical experts had shown that there were 97 million possible compounds from the given starting materials, but it was impossible to predict which would be valuable in chemotherapeutics; sulphathiazole was an extraordinarily useful drug and was described by Sir Lionel Whitby, in his evidence for the respondents, as among the best three sulphonamides. The proved utility of two particular products out of hundreds or thousands coming within the terms of the unamended specification could not suffice, however, to provide subject matter for the invention as claimed, and the petitioners' objection on lack of subject matter was well founded. There was a disparity between the inventive step and the width of the monopoly claimed, and this also afforded good ground for objection. Inutility had also been made out by the same evidence as that used to establish lack of subject matter, and the patent was invalid for these reasons.

While this action may result in a lower price to the public for sulphathiazole, because competing manufacturers may now prepare this compound at cost only, manufacturers may tend to diminish the volume of their research work if they feel that protection of their results cannot be maintained. In industry research is financed from profits, and an immediate gain to the consumer is not necessarily an ultimate gain.

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Modern Hospitals

V

ROSKILDE HOSPITAL, DENMARK

KNUD BIERRING
M.D.
CHIEF SURGEON

NEARLY all hospitals in Denmark are publicly owned. Most are administered by county or town councils; but the State operates the mental hospitals, except for Copenhagen, which has its own mental hospital here in Roskilde. Otherwise the State has only a few hospitals—for instance, the Rigshospital in Copenhagen, which is one of our two university clinics (the other is in Aarhus), and two hospitals outside Copenhagen.

Both in Copenhagen itself and in the provinces there are several private Catholic hospitals; but they, like other hospitals, are helped by public funds. Finally, we still have a few private nursing-homes, almost exclusively in Copenhagen; these are likely to disappear gradually.

HISTORY OF DANISH HOSPITALS

The publicly owned provincial hospital is of fairly recent origin in Denmark. The view now held by the public that the more serious illnesses can be treated better, or indeed only, in a hospital is even newer; it is, of course, based mainly on the great advances of the past two generations. On the other hand, it has long been held that the poor and the sick should be cared for: the convents and monasteries bore witness to this in the Middle Ages; but with the Reformation these were broken up, the Catholic orders abolished, and the land and buildings appropriated by the State. Some of the buildings, however, were preserved as asylums for the sick and the poor; and of these a few had one or two hospital wards.

Outside Copenhagen the first hospitals proper were built in the latter part of the 18th century. In 1806 a royal decree proclaimed that one or two hospitals were to be built in every county. The next year, however, Copenhagen was bombarded; and the war with England and the subsequent economic depression prevented for some time the fulfilment of this order. Eventually, with small means and extreme frugality, one little hospital after another was built; but as late as 1840 hospitals in the provinces numbered only 24, compared with 155 a century later. When, in 1841, the county councils were formed they took over the administration of the provincial hospitals; in the past hundred years they have fulfilled their task sympathetically and generously, building up and extending the institutions in their charge.

ROSKILDE NINETY YEARS AGO

The first county hospital at Roskilde was opened on April 1, 1857. As the years went by it was extended and improved; and today the original building houses only the administrative offices, the kitchen, dining-rooms, and residences (fig. 1 (1)).

When, in 1855, plans were being drawn up the county council suggested that the town of Roskilde should coöperate to make the hospital a joint enterprise; the proposal was not accepted. In the years that followed numerous conferences were held to discuss the suggestion; but it was not until 1936, when the county resolved to build an entirely new hospital, that town and county finally came together.

Originally the provincial hospitals had only one chief doctor, who had to undertake the treatment of all kinds of disease. Since 1912, however, the hospitals have one after another been divided into surgical and medical departments—a development which proceeded rapidly after the end of the first world war. Now every county has at least one hospital with special departments for surgery and internal medicine; in most there is an X-ray department; and in a few an ear, nose, and throat department. It is only in the largest provincial hospitals that this specialisation has been extended further.

On the death of its chief doctor in 1934, Roskilde Hospital underwent this division into medical and surgical departments, and a fully trained chief was appointed to each. The next year a radiologist was appointed. Later, an isolation hospital owned by the town was acquired; and in 1938 a small private nursing-home was purchased and converted into an ear clinic with its own chief.

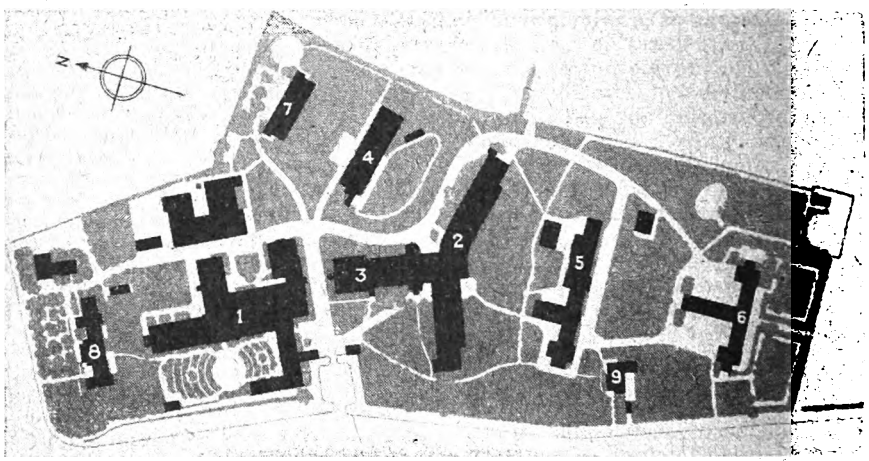

Fig. 1—Ground-plan of the hospital.

THE NEW HOSPITAL

Construction of the new hospital began in the summer of 1937, and was completed in 1940, just in time to avoid serious difficulties through the war. Linoleum had been bought in England; and when war broke out about half had still to be delivered. It arrived at Christmas, 1939, having been shipped to Genoa and transported overland through Germany.

The old hospital was completely restored; and with various other new buildings the hospital buildings have the outline shown in fig. 1. In the new hospital (2) the ground-floor and first floor are taken up by the medical department, with 120 beds, and the second and third floors by the surgical department, with 126 beds. The treatment block (3), which is a wing of the ward building, has the remedial baths and massage department in the basement, the X-ray department on the ground-floor, the heliotherapy department and laboratories on the first floor, and the operating-theatre on the second floor.

The small tuberculosis department (4), comprising 17 beds, is intended only for patients awaiting admission to a sanatorium; in this building we have also a tuberculosis dispensary.

The ear clinic (5) has 30 beds and a fairly large out-patient department. Finally, the infectious-diseases block (6) takes up to 40 patients. Thus, all told, the hospital accommodates about 330 patients.

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In the grounds are the residences of the house-physicians and interns (7), the superintendent (8), and the chief surgeon (9); the chief doctors live in the town.

Additions now needed include a department of obstetrics and gynæcology, a new infectious-diseases department, possibly a small eye clinic, and decidedly more living quarters for the staff. Unfortunately, however, these wants cannot be realised for some time yet, owing to the country's economic difficulties.

At present the hospital serves a population of about 70,000. It should be added, however, that in Roskilde there is also a private Catholic hospital with 100 beds, and that the other municipality in the county—Køge—has a small hospital with 60 beds.

In the year 1934, before the hospital was divided into two major departments, 2500 patients were admitted: ten years later, in 1944, admissions totalled 6000. In 1934, 1092 patients with surgical lesions were admitted, and in 1944 about 3000—almost a threefold increase. Since the population increased by only about 5000 during these ten years, the increased number of admissions must be attributed to the greater readiness of sick persons to enter hospital, perhaps to the specialisation at the hospital, and possibly in some degree to the attractive conditions in the new building.

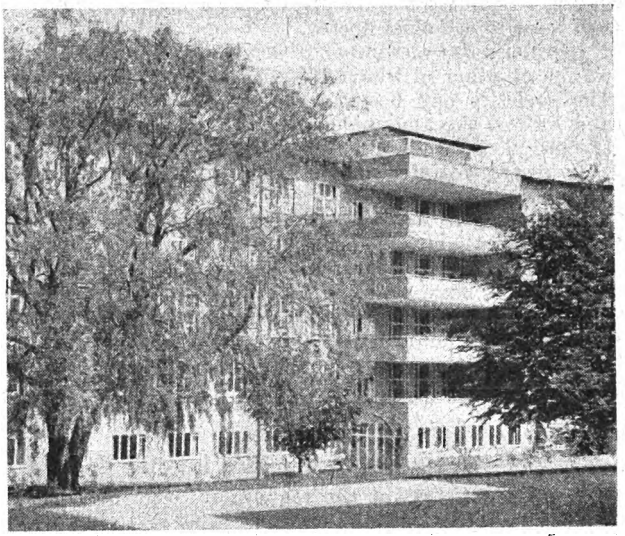

Fig. 3—The ward-block, looking south

MEDICAL STAFF

The medical staff comprises 19 doctors, including 4 chiefs (surgeon, physician, otologist, and radiologist), and 15 resident doctors, physicians, and interns—5 in the surgical department, 5 in the medical department, 2 in the ear clinic, 2 in the tuberculosis dispensary, and 1 in the X-ray department. In addition, a consulting ophthalmologist is attached to the hospital; he is entitled to admit and treat ophthalmological cases in the department of surgery, but not as private patients. Finally, we may call on other consultants—for example, a neurologist—in doubtful cases.

The chiefs have a fixed salary of about £1300 a year. Besides their hospital work they are allowed to hold private consultations at the hospital; when requested by private practitioners they may visit patients outside the hospital, but such requests are rarely made, and in the case of the surgeon hardly ever.

The other members of the staff are divided into two groups: resident doctors and interns (more recent graduates). Appointments for first resident doctors are limited to five years; for second resident doctors to three years; and for interns to six months or one year. This limitation, which was imposed at the request of the Society of Junior Doctors, is designed to give each a fair chance of gaining hospital experience. Hitherto the salaries of these younger men have been small; but recently they have been considerably increased. Every resident doctor has a flat in the hospital; the interns have their own quarters and are given board and other emoluments.

NURSING STAFF

The nursing personnel are supervised by two head nurses and an assistant head nurse. Each section of the hospital is supposed to take 30 patients; but unfortunately the department of surgery is nearly always greatly overcrowded. Each section is in the charge of one sister, three assistants, who are trained nurses, and six probationers. The operating-theatres are staffed by a sister, four assistants, and two probationers.

During the latter part of the war, and even more since then, it has been almost impossible to obtain the required number of nurses; the health authorities are trying to find a solution to this grave problem.

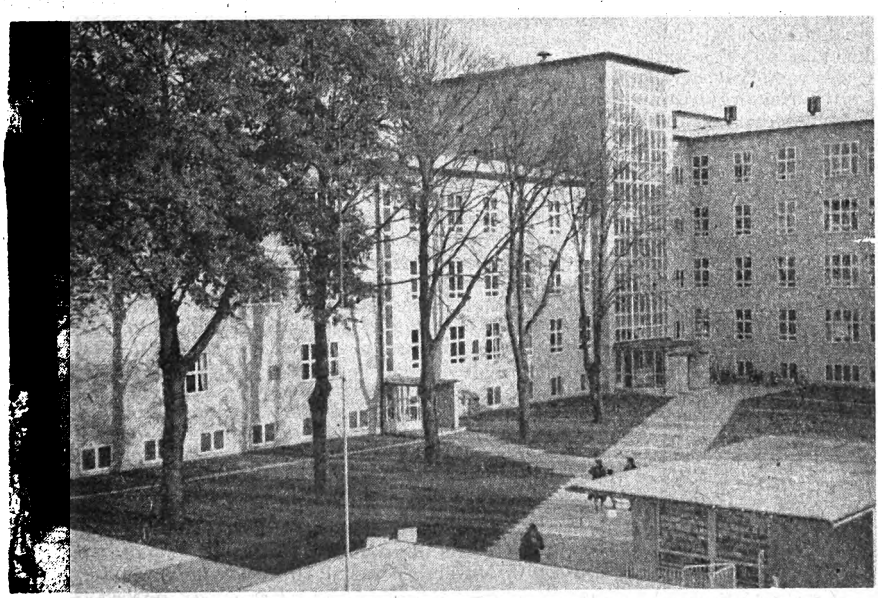

Fig. 2—The main entrance: treatment wing on the left, and part of the ward-block on the right.

ADMINISTRATION

The hospital is managed by a board of eight directors elected by the county and town councils. This board meets four times a year; the departmental chiefs attend the meetings but have no vote. The board appoints a business committee of five, who settle day-to-day affairs. The chiefs are occasionally summoned to their meetings but take no part in their decisions.

Management is in the hands of a superintendent who is also secretary of the committee; the number of his staff has swollen lately, partly because of the intricate rationing system.

PAYMENT BY PATIENTS

Patients living in the district served by the hospital make a comprehensive payment of 6*s*. 6*d*. a day in the wards and 10*s*. a day in single rooms. Patients living

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in other counties pay 12s. and 18s. a day, respectively, and a fee to the chief doctor.

Denmark has a number of health-insurance societies, to one or other of which 80% of the population belongs. The societies pay hospital charges for their members; and by law the amount charged to them is only half of the ordinary rates.

In recent years the State has granted a small sum to all public hospitals in Denmark; hitherto this has been at the rate of 3s. per inhabitant each year, but the contribution is now being increased to a total of about £2,000,000, or about 10s. per inhabitant.

Expenses have risen during and since the war; and each patient now costs the hospital about £1 a day. The deficit, amounting to about £50,000 a year, is met through local taxation.

Public Health

Brighton Sanatorium Inquiry

LAST September, at the request of Brighton corporation, Dr. N. R. Beattie, on behalf of the Ministry of Health, held a public inquiry into complaints about the patients' food and the medical administration of the borough sanatorium, with special reference to the death of a patient three weeks after her discharge. In the report sent to the corporation last month the Minister said that he did not consider that these last graver charges had been substantiated, but he added that general conditions at the sanatorium were unsatisfactory owing to the unsuitability of the premises. He was, however, satisfied that the medical and nursing staff carried out their work as efficiently as conditions allowed.

On the other heads the report is less reassuring. Of recent years the service of food has not always been "of the standard which should have been maintained even when account is taken of war-time difficulties." Since 1943, the report continues, there had been improvements, but "much dissatisfaction among the patients could have been avoided if closer and more constant attention had been given to the quality, preparation, and service of the food." The report also criticises the hospital service subcommittee and health committee of the corporation for not giving "sufficiently careful attention to the complaints laid before them (however ill founded or exaggerated they must have thought them to be) and because they showed less than proper consideration toward those who lodged the complaints and failed to give them sufficient opportunity of being heard."

Food-poisoning in London

Enterocolitis due to *Salmonella typhi-murium* was diagnosed last month in 4 children from a single household at Hammersmith, of whom 2, aged seven months and twenty months, died. Investigation showed that of 13 people in the house 11 were infected with the organism. The source of infection has not been identified; possible sources were said at the inquest to be mice, and egg-powder used in making a Christmas cake.

Notifications of Infectious Diseases

ENGLAND AND WALES

Disease	Week ended Jan. 3	10	17	24	31
Cerebrospinal fever	55	60	47	47	48
Diphtheria	225	216	203	199	200
Dysentery	86	114	96	131	208
Encephalitis lethargica	2	2	1	...	1
Measles	4490	3746	3304	3457	4233
Ophthalmia neonatorum	58	56	39	64	69
Paratyphoid fever	39	8	4	7	4
Pneumonia, primary and influenzal	1098	975	787	780	850
Polioencephalitis	4	6	2	3	4
Poliomyelitis	59	52	47	35	49
Puerperal pyrexia	112	108	102	110	106
Relapsing fever	1	...	...	...	...
Scarlet fever	1786	1525	1754	1847	1926
Smallpox	..	...	..	..	..
Typhoid fever	5	3	2	6	2
Whooping-cough	1891	2057	2343	2547	2725

Letters to the Editor

TO THOSE UNDER FORTY-FIVE

SIR,—My reply to Mr. Rutherford Black and to Dr. L. P. Gray resolves itself into a statement of belief.

Our lives are changing and we must adjust our ways to the new conditions. We no longer believe that we are born with unequal rights, and that some by the mere fact of birth are entitled to more of this world's goodness than those born among the lower orders. The former organisation of our profession suited the Tudor doctrine of "degree" with its "priority and place": the new health service is an attempt to suit "equality" and is "dedicated to the proposition that all men are created equal." This is the principle to which the nation has put its seal. To this principle we must apply that of our profession: "to do the best for our patient that is before us."

Our function is to build up the new health service from within, with just those same principles of good, kind, and true care of our patients as we gave under the old organisation. That is within us; you cannot give that by an Act of Parliament or by rules and regulations—nor can you destroy it by them either. There will be risks; there will be difficulties; there will be faults to be thrashed out in every area of the land, north and south, agricultural and industrial, each in its own area distinct from every other. Let's get down to these; but to do so we must get in it first.

I still believe that, at their meeting that is to follow the counting of the votes, the council of the B.M.A. will decide to advise their followers to join; and that they will do so the more if they have a majority at their back. This will need courage; but it will be the statesmanlike thing to do. To give way, to come in, and then to settle down to discussion of details.

Today this country is in a position of danger unequalled since the summer of 1940. There is no titan of heroic mould to call us to unity; nor would unity be a solution, for the difficulties are within the State, and not from without. Such dangers need compromise, not fighting; and one form of compromise is for the section of the community to give way when discussion has come to an impasse, as it has here, rather than place the personal œconomy of its members, and the traditions of its class, before the good of the nation.

London, W.1. T. B. LAYTON.

THE NEED FOR AGREEMENT

SIR,—The rôle of the peacemaker is not an enviable one, for he is liable to attack from both sides. Yet peace comes in the end. The differences between the opposing sides of the National Health Service Act must be adjusted some day. The important point is how it can be done.

The real differences are on only three points—the payment of a basic salary to practitioners, the abolition of the sale of practices, and the right of appeal.

1. The possibility that the National Health Service will develop into a whole-time salaried service is feared by the whole profession, and in the basic salary they see the thin end of the wedge. Their fears would disappear if it were stated plainly that the basic salary will never form the whole of the general practitioner's remuneration.

2. Many practitioners have locked up a part of their capital in buying their practices and have looked forward to being reimbursed by their sale on retirement. They do not yet know on what basis they will be compensated, and they object to the threat that unless they come into the scheme by July 5 they will get no compensation at all. There is no excuse for such a threat to a body of men who are exercising the right of choice given them under the Act. The practitioner is indignant at what he considers blackmail.

3. The right of appeal to the courts might concern anyone, but will actually concern very few. There can be no argument against it if there is any belief in British justice.

Apart from these objections the Act is probably favoured by the profession. But if it is put into force without agreement neither side will benefit and the public will suffer. Even if there are enough doctors to work it, and the rest of the profession are forced to come in beaten, there will be constant friction, difficulties will

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be raised on all sides, and the Government will be in a position it should go any lengths to avoid.

Three courses seem to be still open. The first and best would be for the two sides to meet again before the results of the plebiscite are known, and in a spirit of conciliation adjust their differences. These must be adjusted sometime and it is better done without compulsion. The second would be to await the result of the plebiscite, after which the side in the stronger position should approach the other with the same end in view. The third and worst would be to have a trial of strength. Are the leaders on both sides so deficient in resource that they cannot come to the amicable agreement they both desire?

London, W.1. DUNCAN C. L. FITZWILLIAMS.

FATALITIES FROM TRIDIONE

SIR,—In an annotation last week you referred to deaths following the use of 'Tridione' and said that at Stockport a girl of nine years died in seven days of a "disease of the blood."

The cause of death in this case, determined at post-mortem examination and recorded by the coroner, was, in effect, toxæmia secondary to acute exfoliative dermatitis. The child, who had been under treatment with tridione for attacks of petit mal, was admitted to Stockport Isolation Hospital with the skin condition in severe form and died a few days later. Blood-counts taken after her admission were within normal limits and showed no evidence of agranulocytosis or other disorder of the blood.

JOHN C. KERRIN
Stepping Hill Hospital, Stockport. Pathologist.

PLANTAR WARTS

SIR,—I have read Mr. McLaughlin's article (Jan. 31) with great interest, for although I am now a medical student I have had nearly fifteen years' experience as a chiropodist and have successfully treated many hundreds of cases of this condition.

Although I see the obvious advantages of the technique described (and in fact intend to use it for suitable cases when I am qualified), I would suggest that the doctor who, from pressure of other work or lack of enthusiasm for minor surgery, does not intend to adopt it can safely refer his case to an experienced registered medical auxiliary chiropodist. My reasons for making this suggestion are:

1. The R.M.A. chiropodist receives a very thorough training in the treatment of verruca pedis, for in a busy practice he has to deal with it almost daily.

2. Adequate chiropodial treatment does not involve the "endless visits" mentioned by Mr. McLaughlin, six treatments or less being sufficient in most cases. A colleague of mine with wide experience as chiropodist to a large catering organisation recently completely cured a case presenting more than fifty verrucæ on the two feet in five treatments and, moreover, without any loss of working-time by the patient; this was possible because good chiropodial technique includes the proper padding of the foot to cushion or relieve from weight-bearing all the affected areas—an undertaking which often requires considerable skill.

3. The early diagnosis of the condition is by no means easy; and the doctor, with his wider interests, cannot be expected to recognise this "trivial lesion" when it may be no larger than a pin-head. Early recognition is important, however, especially in children and young adults using swimming-baths or undertaking other communal activities with bare feet. A timely word to the headmaster of a boarding-school can avert the epidemics of plantar warts which are so prevalent in these and similar institutions.

4. In certain cases, as in the aged or extremely nervous, the combination of gradual excision and potential (chemical) cautery which is practised by most properly trained chiropodists can be said to be advisable in order to avoid even "a minor surgical operation."

I was astonished to learn that this condition is "widely regarded as intractable and worthy of the radiotherapist's most ardent efforts" and that as a result of treatment by irradiation radionecrosis is by no means uncommon. It is because of this that I have suggested that the registered medical auxiliary chiropodist, by virtue of his training in, and concentration on, a small aspect of medical work, has a contribution to make in the treatment of verruca pedis which should not be despised, and which in many instances can relieve the busy medical practitioner of an unnecessary burden.

London, W.1. JOHN F. SANTER.

SIR,—From my own experience I can endorse Mr. McLaughlin's statement that in the treatment of warts curettage *and* diathermy is most successful.

There are two further methods which also rarely fail. One is hypnosis; 2–4 sittings only are required, and after a few weeks the warts shrink and fall off. This method proved so successful, even with multiple warts, that the German army, although very conservative about new treatments, had warts treated in this way. The other method is to infiltrate the wart thoroughly with 70% glucose injected through a fine needle. If this is repeated daily for 4 or 5 days the wart will come off easily.

London, W.11. J. WITTENSTEIN.

SMOKING IN SANATORIA

SIR,—From long and varied experience in the treatment of pulmonary tuberculosis in sanatoria, Dr. Todd and Dr. Wittkower (Jan. 10) conclude that "no harm can come to the ordinary type of patient by allowing a maximum of five cigarettes, or two pipefuls of tobacco, daily." About 70% of smokers inhale; and in my experience the fewer cigarettes a smoker takes, the more deeply he inhales the smoke. Be that as it may, it is inconceivable that the repeated application of the irritant and toxic fumes of smouldering tobacco to healthy, let alone to diseased, lung tissue should be thought by experienced medical men to do no serious harm; yet this appears to be the general view since smoking is now permitted in almost all sanatoria and hospitals in this country.

I have been studying the action of tobacco smoke on the human organism for over 20 years, and I think it probable, not only on theoretical grounds but in view of the definite improvement in the great majority of patients with chronic pulmonary tuberculosis whom I have persuaded to give up smoking, that the grave position in which we find ourselves in this country in regard to the prevention and cure of pulmonary tuberculosis may well be directly related to the failure of our profession to prevent and cure the habit of smoking tobacco.

There is, I suggest, urgent need for an objective assessment of the progress made by two large, and as nearly as possible similar, groups of tuberculous patients under treatment in sanatoria, one observing a strict non-smoking régime and the other smoking five cigarettes a day. The assessment should be made by non-smoking doctors for reasons which I have given elsewhere,[1] and, in order to eliminate psychological factors, neither patients nor their attendants should know that an investigation is being undertaken.

Wallasey. LENNOX JOHNSTON.

EMOTIONAL EFFECTS OF ILLNESS

SIR,—Your annotation on Jan. 24 advocated a team, including a psychiatrist and social worker, in the treatment of anterior poliomyelitis and of those surgical cases where presumably the surgeon cannot exploit "the transference situation."

While the psychological aspects of a case should clearly receive attention, I would ask: (1) Why this jargon? What does exploiting the transference mean in this context other than the surgeon exploiting the patient's confidence in him? (2) Why the growing tendency to believe that a psychiatrist is needed to perform tasks which any competent doctor with a sympathetic understanding of his patient's anxieties can perform? (3) Why are psychiatrists always expected to work in teams? This has intriguing possibilities, and perhaps we shall yet see merit recognised by the award of a Maudsley cap or a Bethlem blue; but I fear there are occasions when a cynic might argue that the most appropriate colours for us would be rose—with no offence to that august body—already belonging to the M.C.C.

London, W.1. W. LINDESAY NEUSTATTER.

1. Johnston, L. *Brit. med. J.* 1947, i, 827.

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PHARMACY OF SODIUM *p*-AMINOSALICYLATE

SIR,—I should like to comment on some of Dr. O'Connor's observations in his letter of Jan. 31.

The preparations referred to in my article [1] were made in November, 1946, using some of the first material produced in this country; and I am well aware that it was far from pure. Actually two samples, which differed in purity, were then obtained, and the less pure one was a dark brown, odorous powder which was not considered fit to use. The other sample, as described in my paper, consisted of cream-coloured crystals melting at 140°C (with decomposition). A recent sample obtained from Ward, Blenkinsop's laboratories, which was a white crystalline powder and presumably intended to be the pure material, was also found to have a melting-point of 139–141°C (with decomposition)—not 150°C as Dr. O'Connor states. Several readings were taken by different workers to make certain of this. A further sample obtained recently from another firm was found to undergo some decomposition at 137°C, but did not finally melt until 150°C.

With regard to the method of preparation of the sodium salt, when my experiments were made there was no information in this country on the pharmacy of the drug, Lehmann's paper merely stating that a 10% aqueous solution had been used. The method then evolved was thought to be the most rational in the light of existing knowledge of the compound's properties.

I consider that Dr. O'Connor's sweeping statements about the deleterious effects of strong alkalis should be substantiated by figures showing the difference in activity between solutions prepared by different methods, with details of the tests used. He states that excess alkali causes hydrolysis, but I fail to see what hydrolysis of the sodium salt can occur in alkaline solution.

I have learned from later work that decarboxylation does occur on heating the drug, and I agree that autoclaving is not the best method of sterilisation, since after this treatment the pH of the solution rises to about 8. I doubt whether much decomposition takes place when the solution is in sealed ampoules and carbon dioxide cannot escape. Nevertheless, filtration appears to be the method of choice.

The drug undoubtedly shows much promise, and, since most of the clinical work so far reported has been done with the brown "impure" preparations, Dr. O'Connor's statement that solutions must be practically water-clear to be fully active cannot be accepted without further proof. It would be unfortunate if the value of the drug were reduced by faulty pharmaceutical technique, and further work is therefore essential.

University College Hospital, London, W.C.1. T. D. WHITTET Chief Pharmacist.

ARTIFICIAL PNEUMOTHORAX

SIR,—The article by Dr. Maclean and Dr. Gemmill (Jan. 31) is of considerable interest to clinicians who have to cope with large numbers of patients in need of active treatment and for whom there is no immediate prospect of a sanatorium or hospital vacancy. Indeed, the present position (6 or more months' wait before admission in many areas) compels a reorientation of outlook, and attention has naturally been increasingly focused on the possibilities of outpatient treatment. It has become obvious that a good deal can be accomplished, given certain limited resources. These include the reservation of hospital beds for the tuberculosis officer (under his direct control); means whereby a phrenic crush can be readily and competently performed; an efficient car-hire service; and the supply of home helps where needed.

While it is of course perfectly feasible to initiate active treatment in the patient's own home, I feel that it is better that primary procedures should be undertaken in hospital, where facilities are better, especially in the event of an emergency. Refills can be performed either at home or in the clinic—preferably the latter since X-ray screening at fairly short intervals is desirable.

It is as well, perhaps, to re-emphasise that pneumothorax therapy requires very particular care both in the selection of cases and in management, even under hospital conditions. The dangers are too grave to be overlooked, and the fact that 3 patients died from spontaneous pneumothorax in the relatively small Glasgow series is a salutary reminder of the possible pitfalls. Fluid formation, with the ever-present risk of empyema, is the other serious consideration.

In view of the not inconsiderable risks associated with "outpatient" pneumothorax therapy many clinicians have resorted rather more often to diaphragmatic elevation by means of pneumoperitoneum, with or without supplementary phrenic crush, as a safer and more reliable method of active treatment for the patient with early cavitation. The results are often extremely satisfactory and serious complications are comfortingly rare. The combination of diaphragmatic elevation and bed rest is in fact particularly suitable for many recently diagnosed cases of pulmonary tuberculosis, and while not in itself necessarily all that is required, it has at any rate the advantage of placing the patient in a more favourable position for subsequent measures should these prove necessary.

Finally, for outpatient treatment the clinic staff must be sufficient; and additional medical assistance may be required.

Redhill Chest Clinic, Edgware, Mddx. NORMAN-MACDONALD.

BREAST-FEEDING

SIR,—In your annotation on breast-feeding (Jan. 31) mention is made of shields to improve malformations of the nipple. I am said to "quaintly term" these "a simple orthopædic appliance." But they are simple to use; they are applied to the breasts; and my dictionary gives as a definition of orthopædics "the correction or prevention of deformities in children, or in persons of any age." My description is thus accurate; there is nothing quaint about it.

I am so much in agreement with all the rest of the annotation that I trust you will not think me merely touchy in asking leave to contradict your annotator on this point. But I fear his wording may produce an unfavourable impression of the appliance's usefulness.

Tunbridge Wells. HAROLD WALLER.

TEACHING APPOINTMENTS

SIR,—"M.R.C.P." chose badly when he instanced (Dec. 27) Sir William Osler's career to support the case against appointing laboratory-trained workers to clinical teaching posts.

As a young man of 28, and though a laboratory worker by training and experience, Osler was appointed professor of medicine at McGill. Osler spoke of it thus [1]:

> "Four years in the post-mortem room of the general hospital, with clinical work during the smallpox epidemic, seemed to warrant the Governors of the general hospital in appointing me, in 1878, full physician, over the heads—it seems scandalous to me now—of the assistant physicians. The day of the election I left for London to take my M.R.C.P. and to work at clinical medicine."

Three months later Osler started his career as a clinical teacher, simultaneously directing the newly opened physiological laboratory. That Osler was a successful teacher of medicine is beyond dispute; in the 1870's he could hardly have been a biochemist, but I think we must count him a good lab. man.

Cambridge. R. M. MAYON-WHITE.

TREATMENT OF LEPROSY

SIR,—At the meeting of the Royal Society of Tropical Medicine and Hygiene reported in your issue of Jan. 31, several speakers directed attention to the lack of hospital facilities for people suffering from leprosy in this country. Emphasising this, the President, according to your report, said that in the past there was limited accommodation for lepers at the Seamen's Hospitals but that such accommodation was no longer available. While agreeing that suitable accommodation for lepers is inadequate I think the remarks quoted do an injustice to the Seamen's Hospital Society. During the last two years to my

1. Whittet, T. D. *Pharm. J.* 1947, **105**, 133.

1. Cushing, H. Life of Sir William Osler. Oxford, 1925; vol. 1, p. 166.

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personal knowledge there have been admitted to the various hospitals of this society 7 cases of leprosy, in addition to others treated in the outpatient departments of these hospitals. Furthermore no patient suffering from leprosy and requiring admission to hospital has been refused admission to one of these hospitals; in fact two cases, pending further arrangements for their long-term care, are at this moment receiving inpatient treatment in one of the hospitals of the Seamen's Hospital Society.

London, W.1. F. MURGATROYD.

TREATMENT OF ARTHRITIS BY INTRA-ARTICULAR INJECTION

SIR,—On reading the article by Dr. Baker and Dr. Chayen (Jan. 17), I find that among 54 cases there were 13 failures and 14 successes, with the rest more or less evenly distributed. Analyses of treatment by other methods show proportions not unlike these; and indeed some methods have a higher percentage of cures and a lower percentage of failures. Every clinician is aware, too, of the sudden and unexplained improvement in the condition of rheumatic patients from time to time, and of the relapses which unfortunately follow. The duration of these remissions and relapses is extremely variable, but it is not uncommon for a patient with osteo-arthritis of the hip, without any local treatment, to remain symptom-free for 2–3 years.

The article by Baker and Chayen leaves the following points unexplained:

1. There is no clear evidence that the 10 ml. of injected fluid enters the joint and is there retained long enough to be useful.

2. Even if the fluid were retained, every single drop would be squeezed away from between the two articular surfaces.

3. The condition of the peri-articular and investing structures is not mentioned. Often one finds myalgic spots in association with severe osteo-arthritis of the hip, and injection of a few drops of procaine solution into these areas will give greatly increased movement and relief from pain without affecting the joint itself. Some of the successes following injection may be due to the procaine solution passing out along the track of the needle and affecting myalgic areas.

During the past eight months I have been trying a different form of treatment, details of which I hope to publish soon. The results, up to date, are encouraging, but I shall attach no real significance to them unless I can prove them to be better than those of other methods of treatment used during the same period.

London, W.1. WILLIAM W. FOX.

CENSORSHIP

SIR,—I have hesitated to add to the wealth of correspondence on this subject, but a misleading letter from "West Africa" (Feb. 7) calls for comment. One of the advantages of the Colonial Medical Service is freedom of publication of matters of general interest, which includes medical subjects, provided that such publication does not refer to political or administrative problems.

This dispensation is not widely known among members of the Service, and the practice of submitting medical articles to the Director of Medical Services is encouraged by the headquarters' staff. Copies of Colonial Regulations, however, are distributed to all new entrants to the Service, and those who take the trouble to read them will realise that their purely clinical articles need not be submitted for criticism by an uninformed administrative staff. Colonial Regulations (1945), part I, no. 57, reads as follows:

> "An officer shall not without the express permission of the Secretary of State or of the Governor act as the editor of a newspaper nor take part directly or indirectly in the management thereof nor publish in any manner anything which may be reasonably regarded as of a political or administrative nature. He may however publish in his own name matter relating to subjects of general interest."

Is it too much to hope that, when agreement has been reached over the principles of the National Health Service, our negotiations will ensure that freedom of publication will prevail in this country as elsewhere?

Department of Surgery, University of Liverpool. FRANCIS E. STOCK.

DIET AND DISEASE

SIR,—It is always refreshing to read descriptions based on original observations. In Dr. Duncan's stimulating article of Dec. 20 I was specially interested in his references to rheumatic fever. Although he does not give exact population statistics, he refers to a "much larger" number than 350 susceptible children whom he observed for 14 years in an isolated community. He also states that during the same time he has not seen a single case of rheumatic fever, rheumatic endocarditis, myocarditis, pericarditis, or chorea either in children or in the whole adult population of the Yukon territory. In his opinion tonsils are as large and septic, and the streptococcus as big a nuisance, in Dawson as elsewhere. Overcrowding and housing conditions seem to be very bad, and the children of large families sleep and live during the hot summer, and in the dark dayless winter with a temperature 70° below zero, in very small cabins. He attributes the freedom from rheumatic infection to their diet consisting mainly of meat, fish, and eggs.

It has been demonstrated[1] that the frequency of recurrences and also the severity of rheumatic infection bears some relationship to certain deficiencies in the diet. In further investigations[2] it was found that in well-nourished rheumatic children the plasma carotene and vitamin-A values in the inactive stage equalled those of the healthy children although in poorly nourished rheumatics these values were lower. In the active phase of the disease however the plasma carotene and vitamin-A levels were considerably lowered. Investigating the effect of improved diet on the recurrence of attacks, Coburn[3] found an incidence of 38% in a group of rheumatic children living on the usual poor diet in New York. Reinforcement of the diet with milk, eggs, meat, vegetables, fruit, butter, and halibut-liver oil was followed by a fall in the relapse-rate in one group of children to 6·75%, in another group to 5%.

In association with A. L. Jacobs, T. Moore, I. M. Sharman, and C. E. Thornton similar experiments have been carried out on a large number of rheumatic subjects during the last three years. Preliminary reports were presented to the Nutrition Society,[4] and some further aspects of these investigations were discussed by me in a paper on Nutrition and Resistance to Infection at the Royal Society of Medicine on Dec. 10, 1947. Our results seem to confirm Coburn's experience that in subjects suffering from rheumatic infection the vitamin-A values are lowered and that this lowering is in relation to the intensity of the rheumatic attack. Some of the available data suggest that the persistent lowering of plasma vitamin-A levels ultimately leads to a severe depletion of the vitamin-A reserves. The full evaluation of our investigations and the planning of further controlled experiments is now in process and detailed results will be published at an early date. It is fully appreciated that our investigations deal only with a part of the claims made by Dr. Duncan, but our suggestions for further research also include other nutritional factors.

Overcrowding and bad housing have been repeatedly incriminated as main causal factors in rheumatic infection during recent years. I should like therefore to draw special attention to Dr. Duncan's remarks about the overcrowding and bad housing in the Dawson area associated with the complete absence of rheumatic infection. I should also like to mention that between the wars there was an unexplained and striking difference in the severity and in the mortality-rate of rheumatism among the child populations of Holland and Great Britain, although there was little difference in overcrowding, climate, race, and age between the affected populations of these two countries. This discrepancy was repeatedly commented on, and some suggestion was actually raised[3 5] that an inadequate diet in Britain was a significant feature.

London, W.1. Z. A. LEITNER.

1. Coburn, A. F., Moore, L. V. *Amer. J. Dis. Child.* 1943, **65**, 744.
2. Shank, R. E., Coburn, A. F., Moore, L. V., Hoagland, C. L. *J. clin. Invest.* 1944, **23**, 289.
3. Coburn, A. F. *Amer. J. Dis. Child.* 1945, **70**, 347.
4. Leitner, Z. A., Moore, T., Sharman, I. M. *Brit. J. Nutr.* 1947, **1**, v.
5. van Breemen, J. Proceedings of the Conference on Rheumatic Diseases. Bath, 1928; p. 39.

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Obituary

HENRY LINDO FERGUSON

KT., C.M.G., M.D. DUBL., F.R.C.S.I., F.R.A.C.S.

BY the death of Sir Lindo Ferguson on Jan. 22, in his 90th year, New Zealand lost one of the most distinguished medical men who ever practised in that country. An Irishman, he was educated in Dublin and won a gold medal in his arts course at Trinity College. He qualified at the Irish Colleges in 1880, and three years later became F.R.C.S.I. While still a student at the Adelaide Hospital he was advised to take up eye work; he was early appointed assistant ophthalmic surgeon to the Richmond Hospital and assistant surgeon to the National Eye and Ear Dispensary, and he became a private assistant to the then oculist to the Queen in Ireland.

For health reasons he decided to go abroad, and he chose Dunedin on account of the recently opened medical school there. He was appointed ophthalmic surgeon to the hospital in 1884, lecturer on his subject at the school in 1886, and professor in 1909. He was the first trained ophthalmic surgeon to establish himself in either Australia or New Zealand, and he soon acquired a very large practice, patients coming to him from all over the country and also from Australia—a long journey for such a purpose at the time. In addition he served at different times on the University Council, the Board of Health, the Medical Council, and other bodies. The first modern hospital wards in New Zealand were built practically to his specification at Dunedin Hospital.

In 1914 he was appointed dean of the faculty of medicine, to the duties of which he gave himself with the most unselfish devotion and with great detriment to his practice. Directly after his appointment the war began, with all the now-familiar difficulties. The school, which had been built up from zero in about forty years, in 1914 contained about 150 students; and these numbers were more than doubled within five years. Naturally a great deal of reorganisation and many new buildings were required. Two separate buildings—for pathology and bacteriology, and for anatomy and physiology—were soon put up, and the medical course was extended from five to six years. These things could not have been done without the utmost persistence on the part of the dean, at a time of great financial stringency and against considerable opposition. He besieged cabinet ministers, travelled overseas at his own expense to inspect medical schools—forty of them—in Great Britain, Australia, and the United States, and collected endowments of about £100,000, to which he himself was a generous contributor. His life's interest was in medical education, and he lived to see the school to which he gave such devoted service an institution fit to stand comparison with any in the Empire for the quality of its graduates.

In addition he was an excellent citizen, and was president of the art gallery up to the time of his death. He was appointed C.M.G. in 1918, and was knighted in 1924, being the first medical man in New Zealand to receive such a distinction for other than military services. He was also hon. M.D. of Melbourne and hon. F.A.C.S. In 1918 he proposed the formation of a New Zealand branch of the B.M.A., and this was established the next year; he served as president both of the Otago division and of the New Zealand branch. He was an original member of the Royal Academy of Medicine in Ireland and of the Ophthalmological Society of the United Kingdom, the first patron of the New Zealand Ophthalmological Society, an hon. member of the Ophthalmological Society of Australia, and a foundation fellow of the Royal Australasian College of Surgeons. He retired in 1937 and was made emeritus professor in the university, and consulting ophthalmic surgeon to the hospital, where new specialist wards were named after him.

He was a man to whom one might take any difficulty and be assured of the sympathetic hearing, the wise counsel, and the practical help of a loyal colleague and generous friend.

Abstracts of the proceedings of the Tuberculosis Association and the Tuberculosis Society of Scotland at their joint annual conference in Edinburgh last July have been published as a pamphlet.

Notes and News

DIABETES IN BERGEN

As the behaviour of diabetes changes in response to new modes of treatment and other influences, we need from time to time to disembarrass ourselves of textbook orthodoxy and see for ourselves what is happening today to the patient himself. Such a tour of inspection has been undertaken by Dr. Per Hanssen, whose monograph [1] deals with an investigation in Bergen, Norway. In this town of about 100,000 people the diabetics studied numbered 794, of whom 392 died in the period 1925–41 and 402 were still alive in 1941. Only 58% of the deaths among male diabetics and 68% of those among females were registered as deaths from diabetes. Since the introduction of insulin official returns have become less and less reliable as an index to diabetes mortality, and Hanssen suggests that the death certificate for a diabetic should state either that death was due to diabetes or that it was due to some other cause in the presence of diabetes. Comparing his material with Joslin's, he finds that the commonest age of onset for diabetes is 5–10 years later in Bergen than in the United States. He has been unable to confirm the observation by Joslin and his associates with regard to the high frequency of radiologically demonstrable arteriosclerosis in diabetics. Other investigations dealt with in this Norwegian study concern the duration of diabetes, its complications, and the causes of death since the introduction of insulin treatment.

FACULTY OF DENTAL SURGERY

THE board of the faculty of dental surgery of the Royal College of Surgeons held its first dinner on Jan. 30, when it entertained some of the senior members of the dental profession who have recently been elected to the fellowship in dental surgery. Sir Alfred Webb-Johnson, who was in the chair, when proposing the health of the guests, reviewed the history of the college and stressed the important part which the new faculty and fellowship in dental surgery will play in its future. Mr. A. E. Rowlett replied for the guests, and Prof. R. V. Bradlaw (the dean), Sir Frank Colyer, and Mrs. Lindsay also spoke.

STREPTOMYCIN SUPPLIES IN THE U.S.A.

EXPORTS of streptomycin from the United States were expected to reach 1,200,000 g. in January, an increase of 300,000 g. over the December quota. According to British United Press the total amount of streptomycin produced in the U.S.A. reached 1,660,000 g. in December, almost double the output of August, 1947. For the whole of 1947 the production total was 9,687,049 g., eight to nine times the 1946 output.

University of Cambridge

On Jan. 30 the following degrees were conferred:

M.B., B.Chir.—M. S. Adams,* P. S. Andrews,* C. P. Atkin,* J. G. Bennette, H. C. H. Bird,* M. D. M. Bowen,* P. H. Bright,* R. W. Brown,* M. H. Clement,* D. Cooper,* J. D. Cox,* J. H. Cule,* E. H. Eason,* J. M. Frew,* R. G. Gibbs, W. N. Ingham,* N. H. Harris,* O. E. F. Hodgson,* D. A. P. Hunt, G. W. C. Johnson,* R. V. Knight,* F. R. Lambert,* Walter Lewis,* J. E. MacIver,* R. K. Mason, John Prestt,* L. C. Robson,* M. H. Russell,* J. D. Scott,* B. E. Shairp, P. H. A. Sneath,* K. C. G. Taylor,* M. B. Thompson,* D. H. H. Walford,* G. R. Walker, B. M. Watney,* Donald Whitfield.

* In absentia.

During January the title of the degrees of M.B., B.CHIR. was conferred on B. Jones and A. E. Perkins.

University of Edinburgh

Dr. Robert McWhirter has been appointed to the Forbes chair of medical radiology which has lately been established.

Dr. McWhirter, who is director of radiotherapy at the Edinburgh Royal Infirmary and lecturer in radiology in the university, graduated M.B. at Glasgow in 1927, taking his F.R.C.S.E. in 1932, and the D.R.M.R.E. a year later. In 1939 he was elected F.F.R. After qualifying he studied radiology at the Mayo Clinic in America, before taking up a British Empire Cancer Campaign research studentship at the Holt Radium Institute in Manchester. Later he was appointed chief assistant to the X-ray department of St. Bartholomew's Hospital. Dr. McWhirter has published papers on cholecystography, and on radiosensitivity in relation to time intensity factor.

University of Birmingham

Dr. Harold Scarborough, lecturer in the department of medicine, has been granted the title of reader.

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1. Diabetes Mellitus in Bergen 1925–41: a Study of Morbidity, Mortality, Causes of Death, and Complications. By PER HANSSEN. Oslo, 1946.

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University of London

Mr. George Perkins has been appointed to the university chair of surgery at St. Thomas's Hospital medical school as from Jan. 1.

Mr. Perkins, who is 55 years of age, was educated at Hurstpierpoint College, the University of Oxford, and St. Thomas's Hospital. In 1914 he took his B.A. with first-class honours, and after obtaining his medical degree two years later he served with the R.A.M.C. as medical officer to the 3rd King's African Rifles, and was awarded the M.C. On demobilisation he held a house-appointment at St. Thomas's Hospital before spending two years as senior medical officer at the Ministry of Pensions orthopædic hospital at Shepherds Bush. In 1922 he returned to St. Thomas's as orthopædic registrar and in the same year he was appointed to the staff of St. Nicholas's Hospital, Pyrford. Later he joined the staffs of the Royal National Orthopædic Hospital, the National Hospital for Nervous Diseases, Queen Mary's Hospital, Roehampton, and St. Thomas's Hospital, where he is now orthopædic surgeon. Mr. Perkins, who holds office as president of the British Orthopædic Association, has published a monograph on *Tuberculous Diseases of the Hip Joint* (1926) and a manual on *Fractures* (1940).

Mr. Leslie Young, D.SC., has been appointed to the university chair of biochemistry at St. Thomas's Hospital medical school as from April 1.

The following have been recognised as university teachers at their schools:

Mr. A. W. Badenoch, Dr. K. O. Black, Mr. H. Jackson Burrows, Dr. A. White Franklin, Mr. D. B. Fraser, Dr. R. A. K. Harper, Mr. A. Henderson Hunt, Dr. R. M. B. MacKenna, Mr. J. E. A. O'Connell, Dr. N. C. Oswald, Mr. H. B. Stallard, Dr. J. W. Aldren Turner, Dr. I. Glyn Williams (St. Bartholomew's Hospital medical college); Dr. W. A. Low (St. Thomas's Hospital medical school); Dr. J. N. M. Chalmers, Dr. M. I. A. Hunter, Dr. N. H. Martin (St. George's Hospital medical school); Dr. F. Ray Bettley, Dr. G. D. Hadley, Mr. R. S. Handley, Dr. Arthur Willcox (Middlesex Hospital medical school); Dr. J. J. Pritchard (St. Mary's Hospital medical school); Miss Jean M. Dollar (Royal Free Hospital school of medicine); Dr. Eric Guttmann (Maudsley Hospital).

Royal College of Physicians of Edinburgh

At a meeting of the college held on Feb. 3, with Dr. W. D. D. Small, the president, in the chair, Dr. J. C. R. Greig (Kirkcaldy), Dr. I. N. Sutherland (Edinburgh), Dr. R. O. Gillhespy (Birmingham), Dr. J. G. Macleod (Edinburgh), and Dr. T. G. Brown (Hamilton) took their seats as fellows. Dr. E. W. Frecker (Sydney, N.S.W.), Dr. D. N. Dobbie (Bromley, Kent), and Dr. S. F. Oosthuizen (Pretoria, South Africa) were elected to the fellowship. The following were elected to the membership:

J. G. Dathan, S. G. Nelson, F. J. Booth, Joseph Adler, J. J. Tillie, W. E. MacLean, James Leckie, A. K. S. Ahmed, Gerald Oomay, W. R. N. Friel, D. E. Ross, Murdoch Beaton, W. H. Galloway, A. B. Hegarty, T. G. Fox, G. M. Carstairs, Elsie C. Gibbons, J. S. Calnan, S. B. Roy, Julius Buch, A. H. Banton, R. McK. Fulton, J. N. Swanson, P. J. J. Barnard, Solomon Jacobson, D. H. Clark, Marjory A. Keith, Hilary F. H. Hamilton.

Royal Institute of Philosophy

On Friday, March 12, at 5.15 P.M., Prof. Aubrey Lewis will deliver a Manson lecture at the institute, 14, Gordon Square, London, W.C.1. He is to speak on Philosophy and Psychiatry.

Universities Federation for Animal Welfare

On Sunday, Feb. 22, at 8.25 P.M. in the Home Service (342·1 m.) Major C. W. Hume will broadcast an appeal for UFAW, of which he is the founder and chairman.

Royal Medico-Psychological Association

At a meeting of the association to be held at 2.30 P.M. on Friday, Feb. 20, at 1, Wimpole Street, London, W.1, Prof. R. W. B. Ellis and Dr. Mildred Creak will open a discussion on the Place of the Psychiatrist in a Children's Hospital.

Society of Chemical Industry

A joint meeting of the Manchester sections of this society and of the Royal Institute of Chemistry will be held in the Town Hall Annexe, Manchester, on Feb. 17, at 10.30 A.M., when Mr. F. C. White will speak on new developments in the German dairy industry, and Mr. H. J. Bunker on war-time production of food yeast in Germany.

Weekend Course on Rheumatic Diseases

The lecturers at this course, which is being held on March 19, 20, and 21 at the rheumatism unit of St. Stephen's Hospital (L.C.C.), will include Prof. J. M. Mackintosh, Prof. B. W. Windeyer, Dr. Francis Bach, Dr. Grace Batten, Dr. Philip Ellman, Mr. Timbrell Fisher, Dr. David Shaw, and Dr. A. G. Signy. Further particulars may be had from the registrar of the unit, St. Stephen's Hospital, Fulham Road, S.W.10.

Regional Board Appointment

The Scottish Western Regional Hospital Board has appointed Dr. A. K. Bowman to be its senior administrative medical officer. In 1938 Dr. Bowman was appointed to the staff of the Department of Health for Scotland as regional medical officer, and he became hospital officer in 1939.

Royal Sanitary Institute

On Saturday, March 6, at 10 A.M., at the Modern Secondary School, Stowhill, Newport, Dr. A. T. Jones will read a paper on the Hospital Services of South Wales. On Friday, March 19, at 10 A.M., at the Manchester Town Hall, Prof. Andrew Topping will speak on Public Health Planning.

The Act in the Scilly Isles

By the Isles of Scilly (National Health Service) Order, 1948, the Minister of Health extends to the Scilly Isles the provisions of the National Health Service Act, with certain modifications. The Council of the Isles is to be the local health authority; and the executive council is to be constituted in accordance with the schedule to the order.

Leprosy Congress

The fifth International Leprosy Congress is to be held at Havana between April 3 and 11. The congress is sponsored jointly by the government of Cuba and the International Leprosy Association, whose general secretary, Dr. E. Muir, may be addressed at 167, Victoria Street, London, S.W.1.

Association of Army Psychiatrists

The fourth reunion of Army psychiatrists will be held at Slater's restaurant, 50, Cannon Street, London, E.C.4, on Saturday, Feb. 21, at 7.30 P.M. Details are obtainable from the hon. secretary, Lieut.-Colonel J. C. Penton, The Old Farm House, 1, Gatehill Road, Northwood, Middlesex.

Resolutions on the Act

The following resolutions have lately been passed at meetings of the bodies concerned:

St. Thomas's Hospital

The medical and surgical officers disapprove of the National Health Service Act in its present form and are opposed to accepting service under the Act until it has been modified; but will continue to treat patients until a settlement is reached.

King's College Hospital Medical Board

That in the unanimous opinion of the consultant medical staff, the National Health Service Act in its present form is not in the best interests of the community; and that the consultant medical staff will not accept service under the Act until agreement has been reached with the profession as a whole.

Worcester Royal Infirmary Visiting Medical Staff

That no member of the visiting medical staff will enter into any contract of service with the regional hospital board unless advised to do so by the British Medical Association.

Faculty of Ophthalmologists

At its meeting on Jan. 9 the council agreed that continuation of the National Ophthalmic Treatment Board in the supplementary service should be supported, but thought it inadvisable for the board to infiltrate into hospitals and use hospital clinics as premises if these premises could be used for clinics under the permanent service.

The council approved the following resolutions put forward by the medical staffs and matrons of the ophthalmic hospitals regarding the report of the Working Party Report on the Recruitment and Training of Nurses:

(*a*) Ophthalmic nursing should be acknowledged as a specialty. It should not be considered part of the training for general surgery but should be carried out in a separate unit or complete department controlled by a specially trained sister, or in her absence by a specially trained staff nurse.

(*b*) Nurses desiring to specialise in this work should be sent to an ophthalmic hospital where possible, otherwise to the eye unit in a general hospital for their intensive training, to be followed (if they still wish to continue in this branch) by one year as a staff nurse under supervision.

It was agreed to recommend that the ophthalmic hospitals should continue to be able to recruit nursing applicants below the age of 18.

The council also approved the B.M.A. Ophthalmic Group Committee's recommendation that, pending the examination, agreement, and approval of curricula by the representative bodies of the profession and opticians, medical practitioners should take no part in the instruction or examination of opticians or student opticians in clinical ophthalmology.

A request has been received from the National Institute for the Blind for copies of technical periodicals to be sent to ophthalmologists in the British zone of Germany. The council asks ophthalmologists to send any periodicals they can spare to the institute, 224, Great Portland Street, London, W.1.

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Celebration in Hungary

To mark the centenary of the revolution of 1848 the Hungarian Medical Trade Union is holding a medical week in Budapest from Sept. 4 to 12. The theme will be diseases affecting large masses of people and having a social background. Visitors from other countries are to be invited to attend and to participate.

Foreign Awards

The following awards to doctors have been announced:

UNITED STATES

Medal of Freedom with silver palm.—Dr. H. M. Sinclair.

NETHERLANDS

Order of Orange Nassau.—Major-General Sir Henry Tidy, K.B.E. (grand officer); Prof. H. P. Himsworth, Sir Francis Fraser (commanders); Dr. C. F. Harris, Dr. Maurice Mitman, Dr. Cyril Bowdler-Henry (officers); Dr. J. Nairn Dobbie (chevalier).

Colonial Medical Service

The Langley prize (value £21) is open to competition among officers of this service who are serving, or who have served, in West Africa. The prize will be awarded for the best paper on some aspect of tropical medicine or surgery, tropical hygiene and sanitation, or tropical entomology and parasitology. Papers, which may consist of either published or unpublished work, should reach the assistant dean of the London School of Hygiene and Tropical Medicine, Keppel Street, W.C.1, by Oct. 1.

N.H.I. Capitation Fee for Drugs and Appliances

The Minister of Health has decided to increase the capitation fee payable to insurance practitioners in respect of the provision of drugs and appliances (except those mentioned in the appendix to the distribution scheme) to insured persons in an emergency or before a supply can conveniently be obtained under the medical benefit regulations. The fee will be increased from 1*s.* 3*d.* to 2*s.* 6*d.* per 100 insured persons on the practitioner's list, other than those for whom he is required to supply all necessary drugs and appliances. In areas where a capitation fee higher than 1*s.* 3*d.* per 100 persons has been approved, the higher fee will be similarly doubled. The increase will have effect as from Oct. 1, 1947.

Refresher Course for School Medical Officers

The school health service group of the Society of Medical Officers of Health is organising a course, to be held at the London School of Hygiene, Keppel Street, W.C.1, from Monday, April 5, to Saturday, April 10, for doctors who are engaged in the work of school medical inspection. The subjects of the lectures will include: the handicapped child as a social and educational problem, common skin diseases of school-children, cardiac disabilities, the maladjusted child, speech defects, deafness in children, the partially sighted child, the epileptic child, orthopædic defects, aftercare in school of children treated in hospital, assessment of fitness for employment. Applications should be sent as soon as possible to the executive secretary of the society, Tavistock House South, Tavistock Square, W.C.1.

Lady Tata Memorial Trust

The trustees of the fund invite applications for grants and scholarships for research in diseases of the blood, with special reference to leukæmia, in the academic year beginning on Oct. 1, 1948. Grants of variable amount are made for research expenses or to provide scientific assistants to senior workers. Scholarships are awarded as personal remuneration; their normal value has been £400 per annum for whole-time research, with proportionate adjustment for work on a part-time basis, where this has been approved. The grants and scholarships are open to workers of any nationality, and in any country in which it will be possible to make payments in the coming academic year. Further particulars and forms of application, which must be returned before March 31, may be had from the secretary of the Scientific Advisory Committee, c/o Medical Research Council, 38, Old Queen Street, London, S.W.1.

On Jan. 14 a lecture-demonstration was given by Lord Horder at the department of rheumatism of the Royal Free Hospital. Further meetings of this type will be held at the department from time to time.

Corrigendum.—The name of the correspondent who wrote a letter to the Editor last week (p. 230) entitled "No Personalities" was Mr. Oliver Blacklay, F.R.C.S.E.

Diary of the Week

FEB. 15 TO 21

Monday, 16th

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. Geoffrey Evans: Arterial Sclerotic Disease.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Sir Harold Gillies: Skin Flaps.
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
9 P.M. Dr. Cuthbert Dukes: Clinical Pathology in Relation to Medical Practice. (First Lettsomian lecture.)
EUGENICS SOCIETY
5 P.M. (26, Portland Place, W.1.) Dr. W. Russell Brain: Some Reflections on Genius. (Galton lecture.)

Tuesday, 17th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. M. H. Campbell: Congenital Heart Disease.
ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. M. C. Wilkinson: Pathogenesis and Treatment of Skeletal Tuberculosis. (Hunterian lecture.)
CHADWICK LECTURE
2.30 P.M. (26, Portland Place, W.1.) Dr. René Sand: How Medicine Became Social.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pathological demonstrations.
INSTITUTE OF LARYNGOLOGY AND OTOLOGY, 330, Gray's Inn Road, W.C.1
9.30 A.M. Mr. M. L. Formby: Non-operative Treatment of Maxillary Sinusitis.

Wednesday, 18th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. A. B. Wallace: Free Skin Grafting.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. C. W. McKenny: X-ray Technique.

Thursday, 19th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Prof. Henry Cohen: Gout.
ROYAL COLLEGE OF SURGEONS
5 P.M. Prof. John Beattie: Hormonal Changes after Injury. (Bernhard Baron lecture.)
ROYAL SOCIETY OF TROPICAL MEDICINE AND HYGIENE, 26, Portland Place, W.1
7.30 P.M. Prof. B. G. Maegraith: Pathological Processes in Malaria. Dr. W. H. H. Andrews: Liver Lesions in Malaria.
BRITISH INSTITUTE OF RADIOLOGY, 32, Welbeck Street, W.1
8 P.M. Dr. R. T. Brain: Radiotherapy in Dermatological Conditions.

Friday, 20th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Professor Cohen: Hyperinsulinism and Hypoglycæmia.
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. R. P. Osborne: Burns and Their Early Treatment.
FACULTY OF RADIOLOGISTS
2.15 P.M. (Royal College of Surgeons.) Mr. Arthur Jacobs, Mr. E. W. Riches, Mr. John Millen: Carcinoma of the Bladder.
TUBERCULOSIS ASSOCIATION
3 P.M. (26, Portland Place, W.1.) Dr. Geoffrey Marshall, Prof. Norman Capon, Dr. Honor Smith, Dr. Douglas Smith, Dr. Richard Brent, Dr. J. W. Crofton, Dr. Robert Cruickshank, Dr. I. A. B. Cathie, Dr. Marc Daniels, Dr. Jacques Bourdin (Paris): Preliminary Reports on the Results of the Streptomycin Trials in Great Britain.
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. Parry Brown: General Anæsthesia for Surgery of the Heart.

Births, Marriages, and Deaths

BIRTHS

BISHOP.—On Feb. 7, in London, the wife of Dr. Peter Bishop—a daughter.
COLLIER.—On Feb. 7, in London, the wife of Dr. Leslie Collier—a son.
ROBERTS.—On Jan. 27, in London, the wife of Dr. K. B. Roberts—a son.
ROSS.—On Feb. 3, in London, the wife of Dr. Michael Ross—a son.
SCOTT.—On Feb. 3, in London, the wife of Dr. W. C. M. Scott—a son.

MARRIAGES

BAYLES—HAWORTH.—On Feb. 7, at Lingfield, Olaf Bayles, M.R.C.S., to Peta Haworth, M.R.C.S.
REID—GILMORE.—On Jan. 31, Robert Kenneth Reid, M.B., to Bridget Gilmore.

DEATHS

BROWN.—On Feb. 2, at Worthing, Herbert Henry Brown, O.B.E., M.D. Lond., F.R.C.S., aged 85.
DICKINSON.—On Jan 31, at Hoylake, Cheshire, William Henry Dickinson, M.R.C.S.
FRANKLIN.—On Feb. 1, in London, Reginald Franklin, M.R.C.S.
GEOGHEGAN.—On Feb. 4, in London, Joseph Geoghegan, M.D. Edin., F.R.C.S.E.
GILBERT.—On Jan. 31, at Cheltenham, Clarence Edwin Lloyd Gilbert, L.R.C.P.I., lieut.-colonel, I.M.S. retd., aged 85.
HOWELL.—On Jan. 28, at Roque Brune, France, Hector Lionel Howell, O.B.E., M.C., M.R.C.S., colonel, A.M.S. retd.
LESSER.—On Jan. 31, Samuel Alfred Hugh Lesser, M.A., M.B. Camb., major, R.A.M.C., aged 36.
MASON.—On Feb. 4, Philip de Roos Mason, M.R.C.S.
PAYNE.—On Feb. 5, Otto Vaughan Payne, B.A., M.B. Camb., aged 68.
PENDRED.—On Feb. 7, Berthon Fleming Pendred, M.R.C.S.

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PROBLEMS IN THE EPIDEMIOLOGY OF POLIOMYELITIS *

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From the Section of Preventive Medicine, Yale University School of Medicine, New Haven, Connecticut, U.S.A.

ONE of the reasons why poliomyelitis has proved an ever-increasing challenge to investigators is that it poses so many fundamental biological problems which have so far eluded solution. In the first place its very existence as an epidemic disease is an extraordinary and unexplained phenomenon of fairly recent origin. Then there are puzzling questions related to the biology of the causal agent, its immunologic and invasive properties; to the pathogenesis of the disease in the human host; and to its mode of spread in epidemic times.

Though poliomyelitis was apparently known to the ancients, the first description of the disease appears to be Michael Underwood's account of paralysis associated with fever in small children in 1789. However, there are no indications that epidemics occurred during the 18th century or earlier. In the first half of the 19th century poliomyelitis was established as a clinical entity, and small outbreaks were reported in England in 1834 by Badham and in the United States in 1843 by Colmer. Heine published his monograph describing the clinical disease in Germany in 1840. Sporadic outbreaks involving small groups of children continued to occur in both Europe and America; but, beginning in 1868 and later in the 1880's, larger epidemics made their appearance. This happened in the Scandinavian countries first, then in the north-eastern part of the United States and in Australia and New Zealand. In England and on the continent of Europe small outbreaks continued; but, in Scandinavia and the United States particularly, tremendous epidemics involving thousands of people began to recur with increasing frequency. This tendency has continued to the present time, and poliomyelitis has the distinction of being on the increase while almost all other infectious diseases have declined.

Why this sudden change from a sporadic disease to an epidemic one of ever-increasing proportions? What factors in host, virus, or environment have brought it about? These are riddles to which no satisfactory answers have been found.

AGE-INCIDENCE

Along with, or subsequent to, the change from endemic to epidemic, the age-incidence has altered in countries where epidemics have been recurrent. Where poliomyelitis is a sporadic endemic disease, and during the first epidemics experienced by a country, the age-group attacked is the infantile one—up to 90% of cases occur in children under 5 years. This was true of the first great Swedish epidemics and of those in Australia and U.S.A. In these countries, however, as has been pointed out by Burnet (1940) and others, there has been a gradual shift in the age-group attacked. Beginning in the 1930's there have been relatively fewer cases in the age-group 0–5 years than in the 5–10 years group, and increasing numbers of cases have occurred in adolescents and young adults. A difference in age-distribution between urban and rural groups has long been recognised, the patients in rural groups tending to be older than those in urban, but in both groups the trend has been towards older and older patients. This trend has been the source of much study and speculation in several countries, including U.S.A. (Forsbeck and Luther 1930, Wenner 1947, Paul 1947b), Scandinavia (Jönsson 1938, Henningsen and Rasch 1940, Bertenius 1947), and Germany (Windorfer 1942).

The difference between a country newly visited by epidemics and one which has had many is illustrated by Japan and U.S.A. respectively. Japan experienced its first large epidemics of poliomyelitis in 1938 and 1940, though the disease had occurred there sporadically and in small outbreaks since 1921 (Paul 1947a). Of the cases in children reported in Japan in 1931–41, 75% were under the age of 3 years, and 90% under 5 years. In contrast, figures for the younger age-group (under 13) in epidemics in northern U.S.A. in 1939–41 indicate that only 36% of patients were in the 0–4 years group, and the spread in the age-group 5–12 years was rather even. The increasing age of poliomyelitis patients in U.S.A. is further illustrated by figures for the state of Massachusetts.† There, in 1907, about 7% of cases were in patients over the age of 15. In the past forty years there has been a steady increase, until in 1945 about 25% of patients were over the age of 15.

CLINICAL TYPE

With the appearance of epidemics and the change in age-distribution, the clinical type of poliomyelitis has also changed. When the disease is truly "infantile," most cases are of the paralytic type, as was illustrated by the great New York epidemic of 1916 in which only 13% of the many thousands of cases were non-paralytic (Lavinder et al. 1918). In recent epidemics in U.S.A. there have been ever-increasing numbers of abortive and non-paralytic cases. Though improved diagnosis and reporting of cases may account for some of this difference, there is reason to believe that they do not account for all of it.

SANITATION

In considering the changes in the epidemiological character of poliomyelitis, one peculiar feature has caused much speculation. This is the fact that great epidemics have appeared and recurred again and again in countries where standards of living and standards of sanitation are highest. In contrast, poliomyelitis has remained endemic and sporadic in countries where living conditions are poor, sanitary facilities minimal or non-existent, and infant mortality high. Since the virus is excreted in large amounts in human fæces by healthy carriers as well as apparent cases, it has been suggested that the virus is so widespread in countries with primitive sanitation that infants are repeatedly exposed in early life to subinfective doses and acquire thereby a lasting immunity. The occasional child who does not acquire this immunity explains the occasional sporadic case. In contrast, in countries where young children are protected from exposure to the virus by the hygienic conditions under which they live, a susceptible population of increasing age is built up, forming the soil in which an epidemic can take root.

IMMUNITY

An opportunity to examine this interpretation more closely has come about as a result of recent experiences of British and American troops stationed in various parts of the world where poliomyelitis has remained endemic. The rates of the disease among American soldiers in such places as the Philippines, the Middle East, and the Far East have been as much as ten times the rates among troops remaining in the United States (Paul 1947c, Sabin 1947). Further, outbreaks among British and American troops have occurred while the native populations have remained relatively free (Paul et al. 1944, McAlpine 1945, Sabin 1947). The introduction of new strains of virus by the visiting troops could not account for this distribution, because the native population would

* Lecture delivered to the Edinburgh Post-Graduate Board for Medicine, Dec. 9, 1947. Much of the work in which the author participated was aided by grants from the National Foundation for Infantile Paralysis, Inc.

† Data supplied to the Yale Poliomyelitis Study Unit by Dr. A. D. Rubenstein, district health officer, Commonwealth of Massachusetts, U.S.A.

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also have been affected. Similarly, if a strain already present had suddenly acquired highly invasive properties —a possible explanation of epidemics suggested by Burnet (1945)—again it would be expected that the natives would have fallen ill as well as the foreign soldiers.

The pattern observed in these outbreaks fortifies the conclusion that the distribution of cases was related to something in the host—to his susceptibility or immunity. It seems reasonable to suppose that the virus was more prevalent in the Philippine Islands, for instance, than in U.S.A., for the rate among American soldiers there was more than ten times that among troops at home. Owing to the wide prevalence of the virus the native population had acquired a substantial immunity. The susceptible American troops, on the other hand, had reached adult age without acquiring such immunity, and therefore contracted the disease at a high rate.

STRAIN DIFFERENCES

Another possibility exists: not only was the British or the American soldier exposed to more virus than he would have met at home, but also he may have been exposed to strains of different immunological type from those he had met previously. Little is known of the classification of human poliomyelitis viruses, because there is no adequate method of studying strain differences. Past attempts to study immune reactions of human serum against standard laboratory strains of virus (either Rockefeller MV or the rodent-adapted Lansing strain) have not given the index of immunity of the population tested as was hoped. This failure is related to the fact that there seem to be many strains of poliomyelitis virus each of different immunological type. Paul and Trask (1933) called attention to the probability that though a patient might not develop antibodies to the MV strain he might develop them to the current epidemic one. Sabin (1947) reports that a patient with paralytic poliomyelitis developed antibodies against her own strain of virus but not against the MV strain. Studies of immune responses of chimpanzees to various strains of virus have been carried out recently. These animals were shown to be susceptible to poliomyelitis virus administered by mouth (Howe and Bodian 1942). When fed virus in food they rarely develop paralytic disease but become intestinal carriers for several weeks or months and develop specific neutralising antibodies to the strain fed (Howe and Bodian 1945, Ward et al. 1945). If the animals are then given by mouth a strain of virus of which they have previously been carriers, they are found to be solidly immune to reinfection. But if different strains are used they can be reinfected again and again (Melnick and Horstmann 1947).

These results suggest that immunity to poliomyelitis may be highly strain-specific. If this is true, the increasing resistance to poliomyelitis with increasing age must be explained on the basis either of exposure to many or all strains early in life or of exposure to unknown strains which have wide antigenic relations and confer a broad immunity. There is also the possibility that increasing resistance with age is, in part at least, non-specific and associated with the maturation of immune mechanisms unrelated to the specific agent.

LOCALISATION OF THE VIRUS

The peculiarities of the epidemiology of poliomyelitis have been scrutinised long and hard for clues to its mode of spread. Investigators have also approached the problem by a study of the natural history of the disease. There was a time, in the 1920's and early 1930's, when it was felt that the natural history and the mode of spread were clearly understood: virus was disseminated by respiratory droplets; it entered the body through the nose, travelled via the olfactory route to the central nervous system, and there set up its characteristic destruction. This simple explanation is no longer tenable in the light of many of the discoveries of the past ten years. One of the most important of these was the rediscovery by Harmon in 1937, and its confirmation by Trask et al. in 1938, of the fact that poliomyelitis virus is excreted in the stools in large quantities and for some time after infection. Kling et al. (1912) had made the original observation twenty-five years earlier, but it had been shelved and forgotten. Its revival reopened the whole question of the natural history of poliomyelitis and its mode of spread.

Tissues

Sabin and Ward (1941a) set out to find where in the human body virus becomes localised. They examined in detail the tissues in 13 fatal human cases and isolated the virus primarily from two systems: the central nervous system and the gastro-intestinal tract. In both of these systems the virus was found to have specific affinities. In the central nervous system it was found in the motor cortex, diencephalon, mesencephalon, pons, medulla, and cord. In the alimentary tract it was isolated chiefly from the pharynx, the wall of the small intestine, and the contents of the large intestine. Virus was not found in olfactory bulbs, anterior perforate substance, or nasal mucosa, indicating that the nasal route of infection in the human disease is not usual.

Excretion of Virus

Studies have also been carried out on living patients to determine what anatomical sites yield virus readily, and for how long in the course of the disease. Horstmann et al. (1944) detected the virus in the stools of 70% of patients during the first 2 weeks of illness, 50% at 3–4 weeks, 27% at 5–6 weeks, and 12% at 7–8 weeks after onset. Between the 9th and 24th weeks only 1 of 53 specimens tested contained the virus; this came from a paralytic patient 12 weeks after onset. Lépine et al. (1939) have reported the longest persistence of virus excretion—17½ weeks after onset of a mild abortive attack.

Though the virus has been isolated from the nasopharynx of asymptomatic contacts (Flexner et al. 1913, Kling and Pettersson 1914, Melnick et al. 1946, Howe and Bodian 1947, Gordon et al. 1947) and from the throats of patients early in the disease (Taylor and Amoss 1917, Paul et al. 1932, Howe et al. 1945), it is more difficult to isolate it from this site than from stools, especially after the first three days of illness. Thus, in a comparison of the excretion of the virus from these two sites in the same patients (Horstmann et al. 1946), the virus was found in the stools of 70% and in the throats of 11% of patients during the first week of illness, and in the stools of 57% and the throats of none during the second week. These results support the earlier observations that the virus is eliminated with greater frequency and for a longer time in stools than in material from the oropharynx. However, this does not solve the problem which is the more important source of the virus so far as the infectiousness of the patient is concerned.

Blood

The blood has also been investigated for the presence of the virus. Early efforts were few and all negative. Poliomyelitis virus has been isolated from human blood during the acute disease only once (Ward et al. 1946). The single positive isolation was from 40 ml. of blood collected from a 9-year-old child six hours after the onset of mild non-paralytic poliomyelitis. Blood from 110 other patients in various stages of the disease was negative. These results suggest that the presence of the virus in the blood-stream in the human disease is not common, but in some circumstances it may reach sufficient concentration in sites of multiplication to spill over into the blood for a short time.

The rarity of such an occurrence is of some importance because of its relation to the question of the possible

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transmission of poliomyelitis by a blood-sucking insect. There are many similarities between poliomyelitis and the arthropod-borne summer encephalitides both as regards seasonal incidence and neurotropism and as regards clinical manifestations. But poliomyelitis differs from the encephalitides in that the virus is very rarely present in the blood, and its pattern of distribution in the central nervous system is different: it is discrete and selective (Sabin and Ward 1941a), unlike the encephalitides, in which the virus is widespread and diffuse in nervous tissue (Hurst 1936).

Experiments on Animals

The information obtained about the sites of localisation and excretion of virus in the human disease have been amplified by experiments in animals, but in the interpretation of such experiments it is recognised that what happens in other primates does not necesarsily happen in man. Chimpanzees have been particularly useful, for they are probably the most susceptible species next to man and, as mentioned above, can be readily infected by mouth. When fed with the virus they usually become intestinal carriers without developing symptoms of involvement of the central nervous system, and excrete the virus in their stools for several months. Bodian and Howe (1945) have made the important observation that chimpanzees sacrificed during the carrier stage, though entirely asymptomatic, may have severe, but scattered, lesions throughout the central nervous system. Thus, though the animals remain clinically well, when they are excreting the virus in their stools they may be presumed to have (or at least have had) the virus in their central nervous systems. This possibility leads one to reconsider the interpretation of the pathogenesis of poliomyelitis expressed by Draper (1926).

TWO PHASES

As is well known to clinicians, poliomyelitis often exhibits a diphasic course. About half the patients who develop signs of involvement of the central nervous system experience a preliminary phase of illness characterised by non-specific symptoms—fever, vomiting, headache, and sore throat. Then follows a period of well-being lasting 1–4 days or even a week or more, and later the second phase, in which there is clinical evidence of involvement of the central nervous system —stiff neck, stiff back, and sometimes reflex changes and paralyses. The patient with mild abortive poliomyelitis experiences symptoms comparable to the first phase only, and some patients who develop either non-paralytic or paralytic poliomyelitis experience the second phase only. Draper (1926) suggested that, in the patient who exhibits a diphasic course, the first phase—the one associated with non-specific symptoms—represents the period of "systemic reaction to generalised infection; the second a highly specialised reaction of the meninges, brain, and cord. . . ." In view of Bodian and Howe's (1945) observations on the presence of lesions of the central nervous system during the asymptomatic carrier state in chimpanzees, it is possible to reason by analogy that human "carriers"—i.e., persons with mild abortive symptoms or none at all—who are excreting the virus in their stools may also be harbouring it in their central nervous systems.

PATHOGENESIS

By bringing these experimental and clinical observations together, the following tentative interpretation of the pathogenesis of human poliomyelitis has been evolved by Horstmann and Paul (1947). The virus probably enters the body by way of the mouth and pharynx (though conceivably it may go through the nose to the pharynx, or even through the skin to the intestinal canal) and passes through the upper and lower intestinal tract within 24–72 hours. Evidence for this is based on the fact that poliomyelitis virus fed to chimpanzees has been recovered readily from their stools one or two days later (Melnick and Horstmann 1947), and virus introduced into their skins has been found in their stools as soon as three days after inoculation—several days before the onset of clinical symptoms and signs (Melnick 1946). If "infection" takes place, the virus becomes "implanted" in certain sites, notably in the pharynx and small intestinal wall. In these sites it probably multiplies. Possibly in some instances virus may remain localised in the pharynx and intestinal tract and spread only if some peripheral trauma, such as tonsillectomy, opens a pathway to the central nervous system for virus already present in the throat. In other instances, however, it seems likely that intestinal implantation is associated with some degree of invasion of the central nervous system. One fact in the human disease which argues for this probability is that sudden onset of paralytic poliomyelitis is often associated with severe exercise. A history of violent exertion followed within a few hours by paralysis of the extremity exercised is common during a poliomyelitis epidemic. In such instances the short interval suggests that the virus must already have been present in the central nervous system, and exercise was merely the precipitating factor which upset the host-virus equilibrium and facilitated the spread of the virus in the brain and cord. In like manner it seems possible that any factor, physical or chemical, which can alter the metabolism of the cells of the central nervous system might have a similar disrupting effect on host-virus equilibrium and thus precipitate the paralytic disease in persons who might otherwise have remained healthy carriers or had only mild abortive disease. That this "accident" may take place as late as 3 weeks after the carrier state has been established is suggested by the case reported by Brown et al. (1945) in a boy who was excreting the virus 19 days before he indulged in severe exercise, which was followed rapidly by paralysis.

DISSEMINATION

The most popular concept of the dissemination of poliomyelitis virus through a community during an epidemic is person-to-person contact. The idea of simple droplet nose-to-nose spread is no longer tenable, but there is considerable experimental and clinical evidence that infection is commoner among contacts of known cases than among non-contacts. Thus Paul et al. (1933) and Casey et al. (1945) have presented data showing that minor illnesses (or mild abortive cases) are 4–6 times commoner among associates of a known case than among controls. Further, the virus has been isolated from the throats of healthy contacts as mentioned above, and from their stools (Brown et al. 1945, Gear and Mundel 1946). Family outbreaks of poliomyelitis are common; and, though often only one child becomes paralysed, several siblings may have minor illnesses compatible with abortive poliomyelitis, and the virus can usually be isolated from them. Zintek (1947) has reported serial observations on the spread of the virus within a family. The stools and throat washings of all five members of the family were negative for the virus 4 days before the first case of poliomyelitis appeared in the group; 4 days after the onset of the first case another of the children developed paralytic poliomyelitis, and on this day all other members of the family were excreting virus in their stools. Of four members of the family two harboured the virus in their throats at this time—one 4 days after and the other 1 day before the onset of abortive poliomyelitis.

These findings, though at first sight they suggest that spread from an infected person to his family and other contacts explains the dissemination of the virus, are nevertheless susceptible to another interpretation: it is possible that common exposure, at more or less the same time, can explain the pattern of infection

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(Aycock and Eaton 1925, Zintek 1947). This possibility has been reinforced by the evidence regarding the excretion of the virus before the onset of clinical symptoms and signs of poliomyelitis. Gear and Mundel (1946) found the virus in the stools of a boy 12 days before he developed clinical poliomyelitis, and similarly Brown et al. (1945) reported that the virus had been found in the stools of a person 19 days before he became paralysed. Thus in a family or community outbreak with multiple cases it is impossible to designate "primary" and secondary "contact" cases, for the first case to appear may have been the last one infected, and conversely the first one infected may be the last to develop clinical signs. Even though new cases in a group continue to appear for several weeks or longer, they were possibly all infected at the same time.

Nevertheless that poliomyelitis may spread by contact, direct or indirect, seems very likely. The way in which the virus has sometimes been observed to spread radially through a homogeneous population at a fairly uniform rate (Paul 1947b) is important epidemiological evidence; and in certain small outbreaks the facts have pointed strongly to spread from an infected person to his associates. Thus Gear and Mundel (1946) have described the spread of poliomyelitis through several families after exposure to a child who was excreting the virus in his stools and subsequently developed paralytic poliomyelitis. Of 10 children exposed to this boy at a children's party 7 became infected: 3 developed frank poliomyelitis, and the virus was isolated from the stools of 4 of the 7 others who remained clinically well. In this small outbreak, which occurred when no other cases of poliomyelitis were reported in the community, the evidence is strong that contact with a known carrier of the virus was responsible for the spread of infection.

The modes of contact-spread are not yet clear. However, recent evidence about how the hæmolytic streptococcus is spread has thrown some light on the general subject of the mechanisms involved in contact-spread of infectious diseases. Hamburger and his associates (Hamburger et al. 1945a and b, Hamburger and Green 1946), in determining the spread of hæmolytic streptococci in epidemics, found that the nasal carrier and not the throat carrier was the dangerous disseminator of organisms. Further, the most effective of the respiratory activities in spreading hæmolytic streptococci was sneezing, and in sneezing the nasal carrier heavily contaminates his hands. The contamination of the hands was concluded to be an important mode of spread of organisms. If a parallel with poliomyelitis may be drawn, these findings fall in with certain facts. The virus is known to be present in the throat rather than in the nose, and its stay in the throat is transient; it is known to become localised in the intestinal tract, and is excreted in the fæces in large quantities and for a long time. These facts, together with the evidence that the oral route of infection may be important, seem to emphasise the rôle of fæcal contamination of hands, food, or other objects in the contact-spread of poliomyelitis rather than spread from the upper respiratory tract.

SEASONAL INCIDENCE AND FLIES

The fact that poliomyelitis is a summer disease has always been an obstacle in the acceptance of simple person-to-person contact as an explanation of its epidemic spread. The sudden burst of cases with the appearance of warm weather repeats itself again and again; and, if summer comes early, so do epidemics. It is interesting that the first large epidemic in England, in 1947, has come in a year with an early and unusually long and warm summer. Why, if contact alone is the answer, does not the virus spread in winter as do other contact diseases? The virus is present in winter—it has been isolated from winter cases (Ward and Sabin 1944)—and crowding and close quarters in winter seem more suitable for its spread than do summer conditions.

This peculiar summer prevalence has led investigators to consider what environmental factors might be involved in the spread of poliomyelitis. Is there an extra-human reservoir of the virus? Tests for the virus in various animals and in blood-sucking insects, though not extensive, have all been negative.

Paul et al. (1941) and Sabin and Ward (1941b) reported the isolation of the virus from flies trapped during epidemics of poliomyelitis. This important observation has been repeated several times in both rural and urban epidemics, and the virus has been isolated from small numbers of flies collected in clean surroundings where sanitary conditions have been excellent. The species of flies most commonly involved have been bluebottle and greenbottle flies (*Phœnicia sericata*) and the blowfly (*Phormia regina*). The strange fact that the usual laboratory animal in poliomyelitis research, the rhesus monkey, is refractory to infection with the virus found in flies as caught in nature, whereas the cynomolgus monkey from the East Indies is susceptible to fly strains, has delayed the study of problems related to flies, because of the inaccessibility of cynomolgus monkeys during the war. Work has now been renewed in this field. Melnick and Penner (1947) have recently fed human poliomyelitis virus as naturally found in human stools to blowflies and have isolated the virus from the flies for 2 weeks and from their excreta for 3 weeks after feeding. But these experiments are preliminary, and there is no proof yet that the virus multiplies or undergoes a part of its life-cycle in flies.

At present the possibility that flies may play a rôle in the epidemic spread of poliomyelitis rests on several points of circumstantial evidence. Both flies and poliomyelitis flourish in summer. Excretion of the virus in human fæces and the large amounts present in sewage during epidemics (Melnick 1947) afford a source of contamination for flies because of their feeding habits. It has been shown by Ward et al. (1945) that food naturally contaminated by flies in an epidemic can, on being fed to chimpanzees, infect them with the virus of poliomyelitis. Nevertheless all of the evidence about flies has not yet been collected, and at present one must conclude that flies may simply be accidental reservoirs of the virus and of no importance in the spread of poliomyelitis, or they may be an important link in the epidemiological chain of events leading to poliomyelitis epidemics.

CONCLUSION

Poliomyelitis exerts its fascination because it is so full of challenging problems. In spite of all the information collected by many investigators in many lands we still cannot say why poliomyelitis suddenly became epidemic almost sixty years ago, why it is increasing rather than decreasing like other infectious diseases, why it is a summer disease with a preference for certain lands, how it is spread, or how it may be prevented. These many unanswered questions are a guarantee of continued search into the mysteries of poliomyelitis.

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DIPHTHERITIC POLYNEURITIS IN THE FAR EAST

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DIPHTHERITIC polyneuritis following infection of mucosa or skin has been described in the Middle East in both world wars (Walshe 1918b, Cameron and Muir 1942). Between the wars Bensted (1936) reported cases of polyneuritis following cutaneous diphtheria among British troops on the North-West Frontier of India. In the latter part of 1942 a polyneuritis associated with the chronic skin ulcers known as "naga," or jungle sores, was encountered among British troops serving in Assam. The isolation of *C. diphtheriæ* from these sores soon confirmed the nature of the polyneuritis, which was to become the major neurological problem of jungle warfare. The 183 cases of post-diphtheritic polyneuritis here described were grouped as follows:

History of jungle sores	76
History of jungle sores and sore throat	73
History of jungle sores and nasal diphtheria	1
History of sore throat	31
History of nasal diphtheria	1
Wound diphtheria	1
Total	183

Jungle Sores.—The primary infection of faucial or nasal mucosa requires no discussion; the jungle sore, which afflicted 150 of the men, merits further description. On arrival at the neurological centre the sores were healed in most cases, but oval or circular areas of brown pigmented scar 2–3 cm. in diameter remained. No parts of the body surface had escaped—there were men with sores on the back, on the face, on the penis, and on the buttocks. The heaviest incidence fell on arms and legs, the ankles and shins being the commonest situations.

There was no correlation between the number of sores and the degree of paralysis, nor was it possible to identify, apart from a history of numbness round a sore, those which had been diphtheritic.

No common ætiological factor could be discovered; leech bites, trauma, and sore feet were all inconstant. The continual damp of the monsoon jungle without doubt predisposed to their development—many began after days of marching along streams; and the humid Mogaung Valley and Indawgyi Lake were particularly notorious areas for jungle sores. Of the 150 jungle sores 110 began in the jungle localities of Assam and N. Burma, and 80% occurred among infantrymen.

The seasonal incidence, too, is instructive—about two-thirds originated during the monsoon period of April–July (fig. 1).

Healing took place within two or three months in 80% of cases:

Duration of sores	*Under 1 month*	*1 month*	*6 weeks*	*2 months*	*3 months*	*Over 3 months*
No. of cases	4	42	16	42	30	16

Bacteriology.—Facilities for adequate routine bacteriological investigation were not available, nor was it possible to carry out any Schick testing. Of the group with jungle sores only, swabs were taken from the sores in 23 cases; 9 were positive and 13 negative, and diphtheroids were isolated from the remaining case.

In the group giving a history of both sore throat and jungle sores, of 28 swabs taken from the throat 24 were negative and 4 were positive (many of these swabs were taken long after the sore throat had subsided), and of 21 swabs from the sores 16 were negative and 5 positive.

LOCAL EFFECTS OF TOXIN

Given the focus of infection on the skin or mucosa, the effect of the toxin on the nervous system may be local or general. Guillain and Laroche (1909) held that paralyses in diphtheria were in most cases related to the site of production of the toxin, and that the nerve centres were attacked by ascending toxic neuritis. Walshe (1918a) observed that cutaneous diphtheria might produce motor and sensory changes of a strictly local character; 8 of 30 cases of polyneuritis following cutaneous diphtheria showed a local paresis. In this series local sensory change occurred in 38 men (25%); no example of a local paresis was observed. Beginning either two to three weeks before, or coincident with, the polyneuritis, an area of numbness 1–2 cm. wide commonly developed round the sore and persisted for two or three weeks. In the few cases personally examined a ring of hypæsthesia and hypalgesia was present round the sore. In 3 cases only was there a wider spread.

Case 1.—A lance-corporal, aged 29, underwent hæmorrhoidectomy under spinal anæsthesia on Aug. 4, 1944. Three weeks later onset of numbness of both buttocks, which lasted a fortnight and then began to recede. At this time numbness and tingling developed below the knees—followed a month later by similar symptoms in hands and forearms. Weakness of upper and lower limbs coincided with the sensory symptoms. No sphincter disturbance.

Case 2.—A signaller, aged 28, in May, 1944, developed a large jungle sore on right buttock, and sores on arms and legs. In mid-June there was blurring of vision, lasting three weeks. In late July onset of numbness round buttock sore, spreading to involve saddle area. Loss of urethral and rectal sensation, with retention of urine and fæces, lasting ten days. Early August paræsthesiæ in feet and hands, spreading to knees and elbows. Coincident weakness of upper and lower limbs.

The third man experienced numbness round a sore over the ulnar styloid, which spread along the inner aspect of the forearm to the elbow.

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TABLE I—INCIDENCE OF PALATAL PALSY AND PARALYSIS OF ACCOMMODATION

Site of infection	No. of cases	Palatal palsy	Paralysis of accommodation	Duration (days)							
				1–7		8–21		22–35		over 35	
				Palate	Acc.	Palate	Acc.	Palate	Acc.	Palate	Acc.
Sore throat	31	27 (90%)	18 (60%)	9	—	8	10	7	8	3	—
Sores and sore throat	73	34 (46%)	55 (74%)	10	18	14	20	5	12	5	5
Sores only	76	15 (20%)	49 (64%)	7	12	4	20	1	12	3	5
Nasal diphtheria	1	1 (100%)	1 (100%)	—	—	—	—	1	1	—	—
Nasal diphtheria and sores	1	1 (100%)	1 (100%)	—	—	—	1	1	—	—	—
Infected hæmorrhoids	1	—	—	—	—	—	—	—	—	—	—
Total	183	78	124	26	30	26	51	15	33	11	10

Palatal palsy is recognised as an example of local neuritis; 78 of the 183 men (43%) gave a history of nasal regurgitation. The distribution and duration are shown in table I. It appears that, in at least 34 of 73 men giving a history of sores and sore throat, toxin had been produced faucially, and that, in the group with jungle sores and no history of a sore throat, 15 men had in fact had an asymptomatic faucial diphtheria.

The interval between the sore throat and the palatal palsy was one to eight weeks, with 60% occurring at an interval of two to five weeks. In the 15 men giving a history of sores only, the palatal weakness arose during the course of the sores in 5, and close on healing in the remaining 10. In two-thirds of the men the duration of the palatal palsy was one to three weeks, with extremes of two and seventy-seven days.

GENERAL EFFECTS OF TOXIN

Impairment of Accommodation

Paralysis of accommodation is one of the keystones on which the diagnosis is built. A history of blurring of vision was given by 124 men (68%) and occurred with the same relative frequency in all groups, as shown in table I. The interval between infection and the accommodation defect was difficult to assess in all but the group of faucial infections; in these cases 73% arose one to six weeks after infection, with extremes of seven and fifty-nine days.

The duration of the impairment was one to three weeks in 65% of the cases. The extremes recorded were one and forty-two days.

In the group with a history of jungle sores only, 40 developed their accommodation defect during activity of the sores; 9 followed close on healing.

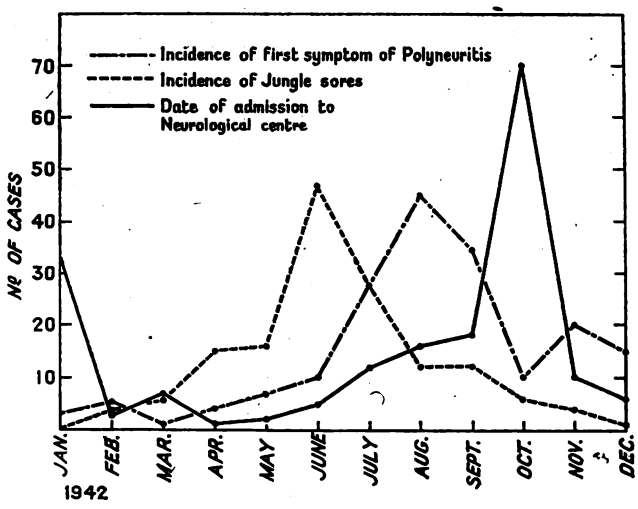

Fig. 1—Seasonal incidence of jungle sores and of polyneuritis.

Polyneuritis

Fig. 1 shows that two-thirds of the cases arose during the period June-September—i.e., after the monsoon period of April-July, when the incidence of the sores was greatest.

The interval between primary infection and the polyneuritis is difficult to assess, as in many cases it was impossible to date the primary infection. The onset of impairment of accommodation being used as a base-line, the first symptoms of polyneuritis developed within four weeks in 75% of the cases (fig. 2).

In one man a hundred days elapsed before an attack of amœbic dysentery precipitated the clinical appearance of the polyneuritis. In 5 cases it was noted that paræsthesiæ in the fingers and toes preceded the accommodation defect by as much as four to six weeks.

The appearance of the polyneuritis was often related to an acute infection, commonly malaria or dysentery—especially malaria, which had affected 82 men, 9 of whom experienced either an exacerbation, or a precipitation, of the polyneuritis. One woman, not included in this series, with a moderately severe polyneuritis following faucial diphtheria, developed malignant tertian malaria and became quadriplegic within twenty-four hours, so much so that the iron lung was made ready. With the control of the malaria, however, there was a rapid return to the pre-malarial condition of the polyneuritis. Similar examples may explain a proportion of the cases described as "malarial polyneuritis."

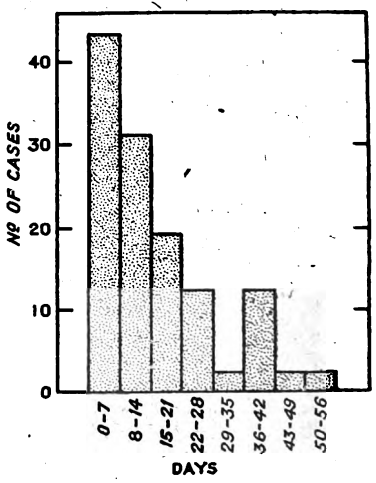

Fig. 2—Time-relation between onset of impairment of accommodation and onset of polyneuritis.

SEMEIOLOGY

The symptoms and signs are remarkably uniform and symmetrical. Sensory symptoms were the first to develop in 90% of cases—manifested as a simultaneous tingling in fingers and toes (99 men), tingling or numbness of the toes (45 men), or tingling or numbness of the fingers (23 men). In the remainder weakness of upper and lower limbs was the first symptom.

The paræsthesiæ remained confined to the fingers and toes in 78 men, but spread to the wrist and ankles in 42, and to mid-calf and forearm in 42. In the remaining

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cases the paræsthesiæ spread higher up the limbs—to knees or groin, elbows, or shoulders. Objectively, hypalgesia and hypæsthesia occurred in the paræsthetic areas, with the most profound change distally. In severe cases there was a loss of postural sense in fingers and toes, with an associated loss of vibration sense. In 77 cases (42%) vibration sense was impaired in the lower limbs, especially the toes and feet. Associated impairment of vibration sense in the fingers was present in 43 of these cases, and loss of postural sense in the toes of 51. A combined impairment of postural and vibration sense in hands and feet was noted in 18 of these 77 men, all severe cases. Trophic changes were not observed.

On the motor side, the peripheral muscles were first affected, always symmetrically, dorsiflexors of the feet first, followed by extensors and flexors of the wrist and fingers. The weakness may become extensive and

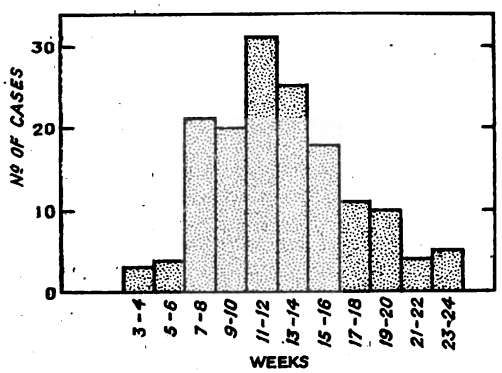

Fig. 3—Length of stay in hospital, all cases.

severe, intercostals, diaphragm, and erector spinæ all suffering. Wasting was not a pronounced feature except in severely paralysed cases. Fibrillation was not observed.

Early in the course of polyneuritis a complete absence of tendon reflexes developed, which persisted longer than any other sign. Return of the deep reflexes varied widely from three to twenty weeks after the onset of the polyneuritis, but on discharge most of the men still showed a lack of tendon reflexes. Most commonly, the biceps-jerk returned first, and the ankle-jerk was almost invariably the last to return. Muscle tenderness was not a feature and was, in fact, so constantly absent that it became a useful differential sign.

Cranial nerves were implicated early in the course of the polyneuritis in 29 men (15%). Transient paræsthesiæ (three to four days) in a trigeminal distribution was the commonest observation—circumoral tingling or numbness, or tingling in the tongue, gums, or roof of the mouth, or along the side of the nose, occurred in 17 men. Fleeting diplopia, lasting three or four days and due to an external-rectus paresis, had occurred in 8 men; and 3 men, all severe cases, had dysphagia and hoarseness lasting for about a month. A mild bilateral facial paresis seemed likely in many men, but this remained a clinical impression only.

Carditis.—Clinically, the diagnosis of diphtheritic cardiac affections may be impossible; symptoms may be few and signs relatively infrequent (White 1938). Electrocardiographic examination should be carried out in every case; unhappily in this series it remained a Utopian dream. Changes in the electrocardiogram persisting for so long as ten to twelve weeks have been observed in severe cases of diphtheria (Neubauer 1942) and may coexist with the polyneuritis. Of 28 cases showing electrocardiographic evidence of cardiac damage, 65% had a coexistent polyneuritis (Burkhardt et al. 1938).

In this series 5 men showed clinical evidence of a carditis: in 4 after infection of jungle sores and in 1 after sore throat and jungle sores. A transient bradycardia was noted in 2 men; a tachycardia lasting four months developed in the third man. The remaining 2 cases were symptomatic only: one man with palpitations during the march of his polyneuritis, and a young officer who complained of precordial discomfort, palpitations, and two fainting attacks in the week preceding the onset of paresis of accommodation.

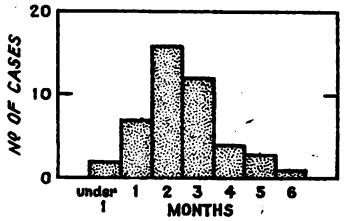

Fig. 4—Length of stay in hospital of patients treated with diphtheria antitoxin.

In the absence of electrocardiographic facilities, a careful pulse-chart was used as a guide, for in the words of Walshe (1941) "until the pulse-rate has fallen to normal, it cannot be safe to mobilise any case of polyneuritis." There were no fatal cases in this series.

Sphincter Disturbance.—In one patient, after spread from a jungle sore on the buttock, a saddle area of sensory change developed, with loss of bladder and rectal sensation, and consequent retention of urine and fæces. In a second man numbness beginning in the feet spread to the level of the umbilicus over the following month. Urethral sensation was retained, but for a week he had difficulty in starting micturition and at the same time developed retention of fæces. Rectal sensation was lost for a month, and he remained constipated for four months.

Previous Diphtheria.—Four men gave a history of previous attacks of faucial diphtheria in childhood—in all the polyneuritis was mild.

Cerebrospinal Fluid.—This was examined in 18 cases at the height of the polyneuritis (table II). An increased amount of protein was observed in 14. There was a mild pleocytosis in 4.

COURSE

Complete recovery from the polyneuritis took place in all cases. The period of recovery, however, varied widely with the severity of the attack, but 70% of the men were kept in hospital for two to four months (fig. 3).

TABLE II—FINDINGS IN CEREBROSPINAL FLUID

Case no.	Time after onset (weeks)	Grade of polyneuritis	Cerebrospinal fluid		
			Protein (mg. per c.mm.)	Globulin	Cells (per c.mm.)
1	4	Severe	100	+	..
2	8	Severe	80	Trace	..
3	10	Severe	60	+	6
4	16	Moderate	80	..	..
5	16	Moderate	100	..	..
6	8	Severe	150	+++	29
7	4	Mild	Increased	..	2
8	8	Severe	24	..	..
9	3	Moderate	100	+	..
10	2	Severe	48	+	..
11	12	Severe	55	..	..
12	2	Very severe	100	..	..
13	12	Moderate	80	+	12
14	2	Severe	100	++	..
15	6	Severe	120	+	..
16	1½	Moderate	33	..	3
17	16	Moderate	60	+	..
18	3	Severe	240	+	10

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All men were recommended a further month at a convalescent depot before being passed fit for active service; 33 men were in hospital for periods longer than four months, the longest stay being seven months, due to a coexistent "shoulder-girdle syndrome." Recurrent malaria, dysentery, or psychiatric causes accounted for 11, 3, and 6 cases respectively. In 12 men the polyneuritis alone was responsible for this prolonged invalidism.

Diphtheria antitoxin had been given to 51 men (28%) in doses of 10,000–100,000 units. The course of the polyneuritis was not significantly altered, 71% of these men falling into the two to four months hospital period. This was explained either by inadequate dosage or by tardy administration of the serum. In all but one case the serum had been given more than twenty-four hours after the onset of the primary infection (fig. 4).

TREATMENT

During the advance of the polyneuritis the patient was strictly confined to bed. The danger from carditis is mostly past by the time the polyneuritis shows itself, but any suggestive evidence of cardiac involvement must necessarily modify the course of treatment.

If there was no evidence of carditis, the treatment resolved into three components: nursing care, physiotherapy, and rehabilitation. The interim period between advance and retreat of the symptoms—usually one to three weeks—was the time when a man was made or marred. Physiotherapy then changed from passive to active measures, always within the capacity of the patient. No medicinal treatment was given, save symptomatically.

RESULTS

Complete recovery from the polyneuritis took place in all cases; 11 (6%) were recommended discharge from the Army for conditions other than the polyneuritis (4 on psychiatric grounds, 4 for a severe shoulder-girdle syndrome, and 3 for tropical eosinophilia, typhus, and diabetes mellitus).

SOURCE OF THE INFECTION

Diphtheria occurs in man, monkeys, occasionally in horses, and in some birds. No species of corynebacterium exists as a free-living organism apart from man or animals; hence the source of infection lies within these groups. After excluding the possibility of an equine source of infection, Cameron and Muir (1942) indicted the native population in Palestine. It was well recognised that the tribes of Assam and Burma suffered from large indolent leg sores, and that similar lesions abounded among Indian troops. However, not a single example of post-diphtheritic polyneuritis among Indian soldiers had been observed by several neurologists in over three years' service in India.

It seemed more likely that the source of infection was the British carrier, for it was probable that in a column of usual strength there was at least one carrier. The men of the column, living in extremely close contact (often sleeping two to a blanket), in poor general condition, and with numerous jungle sores, formed an ideal community for infection by the carrier in their midst.

INCIDENCE OF POLYNEURITIS

Most authorities agree that polyneuritis develops in 10–20% of cases of faucial diphtheria (Rolleston and Ronaldson 1940). The incidence following cutaneous infection is not so certainly known. Cameron and Muir (1942) recorded a 7% incidence, and Bensted (1936) a 9% incidence. Gaskill and Korb (1946) report the much higher figure of 43%.

No precise figures are available about the extent of diphtheritic infection of the skin in Assam and Burma. In view of the large numbers of men who had jungle sores, and the relatively few cases of post-diphtheritic polyneuritis, the figure of 43% appears excessive.

SUMMARY

The findings in 183 cases of post-diphtheritic polyneuritis among British troops fighting in the jungles of Assam and Burma are reported.

In 150 cases the polyneuritis resulted from diphtheritic infection of a jungle sore, a chronic skin ulcer which developed during the monsoon period and afflicted many men.

The source of infection was considered to be the British carrier. Conditions peculiar to jungle warfare were particularly favourable to carrier spread and to the development of polyneuritis.

A typical clinical pattern was observed: paresis of accommodation, sensory symptoms in toes and fingers, and weakness of the limbs in sequence. In contrast to previous reports, absorption of toxin along nervous pathways related to the focus of infection did not play an important part in the production of the generalised neuritis. An increased amount of protein in the cerebrospinal fluid was noted in the more severe cases, indicating radicular changes.

Recovery was complete in all cases, though lengthy stay in hospital was necessary in most. No specific treatment was given; active physiotherapy was begun as the march of the polyneuritis was halted. In spite of lack of facilities for electrocardiography there were no disasters, nor will there be any if due respect is paid to the possibility of a coexistent carditis.

My thanks are due to Lieut.-Colonel Hugh Garland, R.A.M.C., and Major M. J. Parsonage, R.A.M.C., for the use of their records.

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TUBERCULOUS CYSTITIS

TRANSPLANTATION OF REMAINING URETER

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IN each of the following cases an active tuberculous cystitis developed or persisted after removal of a tuberculous kidney, and was treated by transplantation of the remaining ureter into the colon. In none was there evidence, at the time of transplantation, of tuberculosis in either the remaining kidney or its ureter.

The results have been encouraging, and we hope our report will lead to this procedure being more often adopted. The life of a patient with tuberculous cystitis is truly miserable, and any measure, even the most drastic, is justifiable if it promises relief from the constant pain, frequency of micturition, and loss of sleep. Tuberculous cystitis rarely yields to conservative treatment: yet there is a tendency to shrink from interfering with the remaining ureter. We hope to show that this fear is unfounded, and that the operation is completely justified, if only because of the immense and immediate relief of symptoms. Further, in 3 of our 4 patients at no time since operation has there been any upset in renal function or evidence of the spread of tuberculosis.

CASE-RECORDS

Case 1.—A man, aged 23, had his right kidney removed at another hospital in February, 1939, because of tuberculosis. After operation he was symptom-free for about six months.

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and then pain, frequency of micturition, and occasional hæmaturia recurred and gradually became worse. In November, 1941, there was frequency of micturition every 15 min. day and night; cystoscopy showed severe cystitis with numerous active tuberculous ulcers on the trigone and round left ureteric orifice; the bladder capacity 5 oz. By June, 1942, the patient's life had been reduced to one of extreme misery; frequency and strangury were so severe as to amount to persistent incontinence, and he found it necessary to wear a rubber urinal day and night to prevent leakage. His general condition had deteriorated, and his weight had fallen from 11 st. 2 lb. in 1939 to 9 st.

He was admitted to the Royal Victoria Infirmary on Feb. 16, 1943; cystoscopy now showed a bladder capacity 3 oz., and active tuberculous ulcers on the trigone and round left ureteric orifice. The urine contained numerous pus cells, red cells, and tubercle bacilli. Intravenous pyelography: moderate dilatation of left ureter and renal calyces, but no erosions or other evidence of destructive changes in kidney. Blood-urea 38 mg. per 100 ml.

The left ureter was transplanted on March 8, 1943 (F. C. P.); recovery from operation was uneventful, with immediate relief of symptoms. At the end of a week watery motions were being passed every two or three hours during the day and every four hours or so during the night. The patient was discharged from hospital eighteen days after operation, feeling, as he said, "a new man." He resumed work as a clerk in October, 1943, and has not lost a day through illness since then; he is a keen sportsman, plays tennis and football, and does a lot of swimming. Seen again in July, 1947, he felt in perfect health and weighed 10 st. 13 lb.; he passes watery motions two or three times a day on an average, the variations depending entirely on his intake; he sleeps for eight or nine hours without a break every night. Intravenous pyelography has not been performed; for a man who feels in perfect health must have a perfectly functioning kidney.

Case 2.—A woman, aged 29, was first admitted to the Royal Victoria Infirmary on March 10, 1943, with four months' history of right renal and suprapubic pain, frequency of micturition every half-hour day and night, occasional hæmaturia, and loss of 2 st. in weight. Cystoscopy on March 17 showed gross cystitis; there were numerous tubercles and small ulcerations on the trigone and round right ureteric orifice; the left orifice appeared normal. The urine contained numerous pus cells, red cells, and tubercle bacilli. Intravenous pyelography: moderate dilatation of right ureter and renal calyces, but no destructive changes; left kidney and ureter normal.

Right uretero-nephrectomy was performed on March 25; convalescence was complicated by postoperative chest infection but otherwise uneventful. The patient was discharged from hospital on April 13 and was seen at short intervals subsequently. There was very little improvement in her condition; all her original symptoms, except hæmaturia, continued; and, as time passed, frequency became more severe and was accompanied by agonising pain. By October, 1943, she was in extreme misery, and she was readmitted to hospital on Nov. 19. Cystoscopy was proved unsuccessful because of the small bladder capacity and free bleeding on attempted distension. The urine contained pus cells and red cells, but no tubercle bacilli. Intravenous pyelography: normal left kidney and ureter.

On Nov. 26, 1943, the left ureter was transplanted into the pelvic colon (F. C. P.); recovery was uneventful, with immediate relief of symptoms. At the end of a week watery motions were being passed every two or three hours during the day and once or twice during the night. The patient was discharged from hospital on Dec. 24 and continued to improve. In March, 1944, she started work as a canteen waitress. She remained in this occupation eighteen months and felt well, regaining the 2 st. in weight which had been lost, and passing watery motions four or five times during the day and once or twice at night. She gave up work shortly after the end of the war, and since then has become somewhat depressed and morose, complaining of fatigue, listlessness, and pain in left loin. Intravenous pyelography in April, 1947, showed a completely normal left kidney and ureter. Renal function tests were also normal.

Case 3.—A woman, aged 39, was first admitted to the Royal Victoria Infirmary on Nov. 29, 1943, with frequency of micturition (every hour both day and night), dull aching pain in right loin, occasional slight hæmaturia, and loss of $1^1/_2$ st. in weight in two months. Cystoscopy showed tubercles and several small ulcers on the trigone and round the right ureteric orifice; the left orifice appeared normal. The urine contained pus cells and red cells, but culture did not grow tubercle bacilli. Intravenous pyelography: dye only in the lower pole of the right kidney, which was obviously the site of severe destruction; left kidney and ureter apparently normal.

The tuberculous right kidney and ureter down to level of pelvic brim removed on Dec. 10, 1943. After this her general health temporarily improved, but frequency of micturition continued and became gradually more severe. By May, 1944, she micturated every 5–10 min. day and night, with strangury; her general health deteriorated rapidly again, and she was in extreme misery. After readmission on June 26, 1944, cystoscopy was attempted but failed because of small capacity of bladder and bleeding on attempted distension. Intravenous pyelography showed normal left kidney and ureter. The urine contained numerous pus cells and red cells, but culture again did not grow tubercle bacilli.

The left ureter was transplanted into the pelvic colon on June 28, 1944 (F. C. P.). Convalescence was smooth. At end of a week watery motions were being passed every four hours during the day; at night the patient slept undisturbed for six or seven hours. Seen again in July, 1947, she was in excellent health and symptom-free; she had gained 3 st. since transplantation, sleeps 8–9 hours every night, and has watery motions on an average two or three times a day. She does all her own housework and has never felt better.

Case 4.—A man, aged 21, had had his tuberculous left kidney removed at another hospital in December, 1942 (no details available). After this he was symptom-free for about two years. He then developed frequency of micturition, which gradually increased up to every 10–15 min. day and night with strangury and occasional hæmaturia, which at times was severe. Admitted to the Royal Victoria Infirmary on Jan. 4, 1946, he was thin, pale, and exhausted from lack of sleep; he had lost 1 st. in a year. Cystoscopy was unsuccessful because of small capacity of the bladder and severe bleeding on attempts at distension. The urine contained large numbers of pus cells and red cells, but no tubercle bacilli were seen and none was grown on culture. Intravenous pyelography showed a normal right kidney and ureter.

At operation on Jan. 15, 1946 (F. C. P.), the bladder was found to be thick-walled, hard, and as big as a tennis-ball. The right ureter was moderately dilated but was otherwise healthy; it was transplanted into pelvic colon. Recovery was uneventful, apart from an immediate and most dramatic alleviation of symptoms. At end of first week watery motions were being passed every five or six hours during the day and sleep was undisturbed every night for seven or eight hours. The patient was discharged on Jan. 30 and remained symptom-free and in excellent health until beginning of April, 1947. He then began to feel unwell and was seen by Dr. A. M. Turnbull, of Corbridge, who, with his father, Dr. J. N. Turnbull, has kindly supplied the following details.

The patient was admitted to Hexham Emergency Hospital on April 9, 1947, with six or seven days' history of constipation unrelieved by purgatives. Two glycerin suppositories produced a motion, after which he felt better, but he still complained of pain in right lumbar region, spreading round to the abdomen. Urinary output had been satisfactory up to date of admission, but on this day there was anuria; he vomited blood and mucus and became suddenly sallow. In hospital the temperature remained normal, the pulse-rate varied from 96 to 100, and the respirations from 20 to 32. There was air-hunger, headache, and occasional hiccup, but no muscular twitching. Blood-urea 360 mg. per 100 ml. In spite of intravenous glucose-saline drip, no urine was passed, vomiting of blood and mucus continued, air-hunger increased, and the patient, gradually becoming comatose, died on April 10.

A necropsy was not made, but the brief and acute nature of the terminal illness suggest either a complete ureteric obstruction or a fulminating infection of the renal parenchyma. There was nothing in the history to suggest that the kidney was tuberculous, though this possibility cannot be excluded.

TECHNIQUE

The operation has been the simplest possible. Briefly, the ureter is exposed transperitoneally, mobilised for as short a distance as possible, and cut across. The posterior

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tænia of the pelvic colon is then split for about 1 in., the underlying mucosa is separated all round for 1/4 in. and a small puncture is made in the distal corner. A suture of 6 × 0 catgut is tied loosely to fix the ureter 1/2 in. through this opening, and the edges of the incision in the tænia are closed over the ureter with one continuous suture of 6 × 0 catgut. The abdomen is closed without drainage.

In none of the cases has it been necessary to deal with the functionless bladder, and the proper measure to be adopted should the need arise is still being considered. It is felt in any case that in these circumstances a total cystectomy is a needlessly severe operation.

SUMMARY

Four patients who had undergone nephrectomy were treated for tuberculous cystitis by transplantation of the single remaining ureter into the pelvic colon.

Three of them were alive and well 4 years and 5 months, 3 years and 9 months, and 3 years and 2 months after transplantation; the fourth died 15 months after operation, the exact cause of death being unknown.

The results in these cases seem to justify more frequent adoption of this operation.

DETERMINATION OF HÆMOGLOBIN

III. RELIABILITY OF CLINICAL AND OTHER METHODS

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THE estimation of hæmoglobin is probably the most frequently performed pathological investigation, and one to which the greatest variety of methods, standards, and instruments has been applied.

This lack of uniformity arises from the fact that no one method has been generally accepted as both accurate and convenient. To be simple, hæmoglobin estimation must depend on the visual comparison of colours or optical densities, a procedure that may involve serious inaccuracy. Though this unreliability has been admitted by most authorities, there have been relatively few attempts to determine the magnitude of the errors inherent in the different methods in common use.

More recent investigations of this question include those of Karshan and Freeman (1929), Pons and Schneider (1930), and Odin and Werdinius (1934) on the acid-hæmatin method, and the more comprehensive study of Karr and Clark (1941) of the Haden, Hausser, Sahli, Hellige, Newcomer, Dare, and Tallqvist methods.

In this country Macfarlane (1945) has investigated the errors of the Haldane-Gowers method in the hands of many observers, and King et al. (1944) have worked with more precise laboratory methods. No systematic comparison, however, of the performance of the different methods in current use in this country has been made. Hæmoglobin estimation by these methods is now of more than local clinical importance, since the results are being taken as an index of nutrition in national and international surveys. More accurate information about their meaning and reliability is therefore required. Moreover, if there is to be any attempt to unify hæmoglobin determination, it must be shown that some particular method is superior to the others as regards accuracy combined with reasonable simplicity and convenience. This paper records an attempt to provide some, at least, of this information.

PRINCIPLE OF TEST

The purpose of the investigation was to assess the relative reliability of several different methods of estimating hæmoglobin in the hands of different observers. By "reliability" is meant the closeness with which the results provided by the instruments under test are proportional to the hæmoglobin content of the sample of blood investigated. Absolute estimates of hæmoglobin were not required, these being merely a matter of calibration of the instruments in terms of an agreed standard of hæmoglobin; it was the variability of the results by any one method that was of interest.

Such variability is due to several factors concerned in the estimations, including the measurements and manipulations required in the preparation of the hæmoglobin derivative to be estimated; the estimation of the concentration of this derivative with various instruments; personal differences between one observer and another in colour matching and technical ability; qualitative differences between one sample of hæmoglobin and another; and differences in lighting. All these factors, except the preparation of the hæmoglobin derivatives (which were made in bulk), were included in the trials of instruments, and the experiment was so designed that the effects of most of them could be assessed separately.

In principle, the trials involved the estimation by several observers of the hæmoglobin content of a particular sample of blood by all the methods under investigation. A number of results on this blood sample were therefore obtained by each method, and the degree to which these results varied was taken as the index of the reliability of that method under those conditions. To allow for possible qualitative differences between one sample of blood and another, and to increase the number of observations, a series of samples of normal blood was examined by the same observers using the same methods.

If a particular method and observer were completely reliable, the ratio *Observed reading/Hæmoglobin content of sample* would be constant over the whole series of blood samples, and the variability would be zero. If the hæmoglobin content of each sample is known, the calculation of such ratios will allow all results by all observers on all samples by a particular method to be used for assessing the total variability. Unfortunately, no completely reliable method of determining hæmoglobin exists, though general opinion supports determination of the iron content of the sample as providing results most closely related to its hæmoglobin content. Such determinations were therefore used as the basis of reference in this investigation.

The investigation, carried out on these lines, was conducted simultaneously at the Radcliffe Infirmary, Oxford, and at the Postgraduate Medical School of London. Concern in Oxford was mainly with instruments of "clinical" type, whereas in London most of the work was done on more accurate "laboratory" methods.

INVESTIGATION AT OXFORD

The Observers

Differences in observers were considered likely to be associated with (1) sex (women claim to be more competent than men to match colours), (2) training, (3) the side of the dominant eye (see Macfarlane 1945), (4) abnormalities of colour-vision, and (5) the effect of fatigue. The group of observers selected for the Oxford experiment consisted of 16 persons in whom these characteristics were distributed as uniformly as possible. Eight were men, eight women. Four men and four women were trained laboratory workers; the remainder were relatively unfamiliar with hæmoglobin estimations. In each of these subcategories two observers were "right-eyed" and two "left-eyed"; and, finally, in the male group two observers were red-green blind.

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The possible effect of fatigue is important. If a particular observer made observations by different methods always in the same order, then fatigue might adversely affect his results on the methods used always towards the end of the session. To avoid this, the order of the methods by which each observer made his estimations was varied by a regular system with each successive blood sample, so that all methods were applied with equal frequency in all positions in the order of use.

Samples of Blood

Each sample consisted of about 120 ml. of normal human blood, kept fluid by the addition of 120 mg. of potassium oxalate and 80 mg. of ammonium oxalate. The blood was collected under aseptic conditions on the day before the tests. Eight samples were used, being taken from normal volunteers (medical students and staff), men and women alternating. The blood was carefully mixed to avoid errors of sampling, and divided into subsamples, one of which was sent by post to the Postgraduate Medical School of London for iron estimations and for the trials carried out there. The remainder were kept at Oxford for testing the instruments.

Methods

In the Oxford trials 16 ways of estimating hæmoglobin were tested, 8 being in common laboratory use with proprietary apparatus or instruments, and 8 being experimental methods designed to explore the possibility of evolving a more satisfactory method or instrument than those existing. The established methods were as follows:

(1) *Haldane-Gowers.*—This method uses a solution of carboxyhæmoglobin both for the standard and the test solutions, the test solution being diluted in a small graduated tube until its colour is thought to match that of the standard solution. The apparatus was made by Messrs. Hawksley to B.S.I. specification.

(2) *Gowers.*—A solution of oxyhæmoglobin is diluted in a graduated tube until its colour is thought to match a picrocarmine standard. The apparatus was made by Messrs. Hawksley.

(3) *Sahli* (Hellige).—A solution of acid hæmatin is diluted in a graduated tube until its colour is thought to match a tinted glass standard.

(4) *Tallqvist.*—A drop of whole blood is allowed to soak into a piece of blotting-paper, and the colour of the stain is compared with a set of lithographed paper standards. The paper and standards were produced by the Wireless Printing Co., New York.

(5) *Tintometer.*—A film of whole blood contained between two glass slips is compared with a set of tinted glass discs mounted in a horizontal comparator.

(6) *Dare* 1.—A film of whole blood between two glass slips is compared with a tinted gelatin-wedge standard.

(7) *Dare* 2.—As above, but the two fields are approximated with a prismatic eye-piece, and artificial illumination is provided. This instrument and the previous one were made by the Rieker Instrument Co., Philadelphia.

TABLE I—PRINCIPLES INVOLVED IN DESIGN OF EIGHT HÆMOGLOBINOMETERS

Instrument	Pigment	Standard	Method of matching	Fields
Gowers ..	$Hb.O_2$	Picrocarmine	Dilution of test solution	Separate tubes
Haldane ..	Hb.CO	Hb.CO	,,	,,
Sahli-Hellige	Acid hæmatin	Glass	,,	,,
Tallqvist ..	Whole blood	Paper	Step standards	Approximated.
Tintometer	,,	Glass	,,	Separate
Dare 1 ..	,,	Coloured gelatin	Moving wedge standard	,,
Dare 2 ..	,,	,,	,,	Optical eye-piece
Sahli-Zeiss	Acid hæmatin	,,	,,	,,

TABLE II—PRINCIPLES INVOLVED IN DESIGN OF TWO EXPERIMENTAL INSTRUMENTS

Instrument	Pigment	Standard	Method of matching	Fields
Hollow wedge colorimeter	Hb.CO Acid hæmatin Cyanmethæmoglobin Alkaline hæmatin	Natural pigment	Moving hollow wedge standard	Optical eye-piece
Neutral grey wedge photometer	$Hb.O_2$ Hb.CO Alkaline hæmatin Cyanmethæmoglobin	Neutral grey	Moving neutral grey wedge standard	

(8) *Sahli-Zeiss.*—A solution of acid hæmatin is compared with a tinted gelatin-wedge standard. The fields are approximated with a prismatic eye-piece. The instrument was made by Carl Zeiss.

It will be seen that certain factors, such as the hæmoglobin derivative used, the method of matching, and the type of standard, are common to more than one of these methods. The data in this respect are summarised in table I.

Wedge Colorimeter.—Methods were designed to compare simple visual colorimetry and photometry, and to determine the relative suitability of different hæmoglobin derivatives for estimation by these two principles. A simple colorimeter was constructed on the 'Autenreith' principle. A long hollow glass wedge was graduated in millimetres from top to bottom, and this wedge was mounted in a frame containing a mechanism for moving the wedge past a small window. A glass cell was also contained in the frame behind a second window, so that, by moving the wedge until the colours viewed through the two windows appeared equal, a standard solution contained in the hollow wedge could be made to match an unknown concentration of the same coloured substance contained in the cell. The position of the wedge was then read from the scale. A prismatic eye-piece was fitted to bring the two coloured fields together. The hæmoglobin derivatives used in this apparatus were:

(9) Carboxyhæmoglobin.
(10) Cyanmethæmoglobin.
(11) Acid hæmatin.
(12) Alkaline hæmatin.

Oxyhæmoglobin could not be used, since no permanent standard solution of this substance can be made.

Grey Wedge Photometer.—This was constructed on a principle described by King (1947), Duffie (1942, 1944, 1945), &c. The standard consisted of a straight neutral grey wedge mounted in glass, there being a regular increase in optical density from one end of the wedge to the other. The wedge was calibrated in millimetres. The test solution was contained in a small cell which formed one half of the optical field, a section of the wedge forming the other. An eye-piece brought the fields together and contained a colour filter (which was green for the red hæmoglobin pigments used in the experiment). Thus the combined light absorption due to the filter and red pigment on one side could be matched against the absorption due to the filter and neutral grey wedge on the other, movements of the latter altering the amount of light transmitted on that side. The pigments used in this instrument were:

(13) Oxyhæmoglobin.
(14) Carboxyhæmoglobin.
(15) Alkaline hæmatin.
(16) Cyanmethæmoglobin.

The data for these two experimental instruments and the hæmoglobin derivatives employed are summarised in table II.

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TABLE III—AN ILLUSTRATIVE SECTION OF THE COMPUTATION

Blood sample no.	Hb (g.) from Fe	Observer's reading	Ratio $\frac{\text{Reading}}{\text{Hb}}$
1	14·75	103	6·98
2	14·97	106	7·10
3	13·54	92	6·78
4	16·38	108	6·60
5	14·45	100	6·93
&c.	&c.	&c.	&c.
Method	(8)		Mean 6·84
			S.D. 0·264
Observer	No. 1		C.V. 4·1

Experimental Procedure

On the day of a test the sample of blood remaining in Oxford was well mixed, and, carefully calibrated volumetric apparatus being used throughout, the necessary hæmoglobin and hæmoglobin-derivative solutions were prepared in bulk as follows:

(1) *Oxyhæmoglobin.*—A 1 in 200 dilution of blood in $N/150$ NH_4OH (0·4 ml. of conc. ammonia, sp. gr. 0·880, per litre of distilled water) was made up in a standard flask and shaken for a few minutes with air. This solution was used for method (13). A 1 in 20 dilution of blood in ammonia solution was prepared for method (2), 0·4 ml. being measured into the diluting tube for each observation.

(2) *Carboxyhæmoglobin.*—A 1 in 200 dilution of blood in $N/15$ NH_4OH (0·4%, 4 ml. of conc. ammonia per litre of distilled water) was made up, and pure CO bubbled through it for 10 min. This was used in methods (9) and (14), and the Hb.CO solution made from the first sample of blood taken was kept as a standard for method (9) for the rest of the investigation. A 1 in 20 dilution of blood was used for method (1), 0·4 ml. being added to the diluting tube for each observation.

(3) *Acid Hæmatin.*—A 1 in 100 dilution of blood in $N/10$ HCl was made up and allowed to stand for an hour before use. This was used in methods (8) and (11). The solution prepared from the first sample of blood was kept as a standard for method (11). A 1 in 10 dilution of blood was used for method (3), 0·4 ml. being added to the diluting tube.

(4) *Whole Blood.*—In methods (4), (5), (6), and (7) the whole blood was mixed well to avoid errors in sampling before setting up the test for each observer.

(5) *Cyanmethæmoglobin.*—A preliminary dilution of the blood (1 vol.) was made with $N/15$ NH_4OH. This was treated with 2 vol. of 2% potassium ferricyanide and, after 10 min., 0·8 vol. of 10% sodium cyanide was added. Ammonia ($N/15$) was then added to give a solution containing the blood in a final dilution of 1 in 200.

(6) *Alkaline hæmatin* was prepared according to the method of Clegg and King (1942). A 1 in 100 dilution of blood in $N/10$ NaOH was made up, and a sample of this was heated in a boiling-water bath for 4 min. and immediately cooled. The standard consisted of crystalline hæmin dissolved in sodium hydroxide (81 mg. of hæmin of 8·41% Fe in 1 litre of $N/10$ NaOH).

Observations

The trial readings were made by the same team of observers in the same room throughout the experiment. Observations by methods requiring daylight were carried out against a grey diffusing screen against the same window; unfortunately a north window was not available. Each instrument was prepared for the observer by an assistant, who filled the necessary cells or wedges with the test and standard fluids, or measured the 0·4 ml. of more concentrated solution into the graduated tubes for the dilution methods, dilution being carried out by the observer. Each observer was handed the instrument by the assistant and was required to make the necessary adjustments to bring the colour of the standard and test to what he considered was a match. The reading was made and recorded by the assistant, who made no comment on the result.

RESULTS

Each of the 16 observers made three separate estimations by each of the 16 different methods in the 8 separate samples of blood, a total of 6144 estimations. The iron content of each blood was determined at the Postgraduate Medical School of London (see below) with all possible care, and the figure obtained was taken to represent the "true" hæmoglobin value. The readings recorded by observers on the various instruments were in arbitrary units; the hollow wedge and neutral grey wedge instruments, for instance, were graduated in millimetres, whereas most of the proprietary instruments were calibrated in terms of a percentage of some standard, which was very different in different instruments. However, if the readings obtained by any particular instrument were strictly proportional to the hæmoglobin content of the samples of blood as estimated by iron analysis, the ratio of the reading of the instrument to the figure obtained by iron analysis would be constant for every reading taken on that instrument. Variations in these ratios, assuming that the iron analyses provided the "true" hæmoglobin, would indicate the variability in the results obtained with the instruments. These ratios were calculated for each of the 6144 different readings. An illustrative section is given in table III.

TABLE IV—COEFFICIENTS OF VARIATION FOR VARIOUS INSTRUMENT/PIGMENT COMBINATIONS TESTED AT OXFORD

Instrument	Blood derivative					
	Whole blood	$Hb.O_2$	Hb.CO	Cyanmet. Hb	Acid hæmatin	Alkaline hæmatin
Haldane ..	—	—	9·0	—	—	—
Gowers ..	—	10·6	—	—	—	—
Sahli ..	—	—	—	—	10·9	—
Tallqvist ..	9·7	—	—	—	—	—
Tintometer	8·5	—	—	—	—	—
Dare 1 ..	10·2	—	—	—	—	—
Dare 2 ..	8·5	—	—	—	—	—
Sahli-Zeiss ..	—	—	—	—	5·8	—
Hollow wedge	—	—	4·7	7·0	6·4	7·8
Grey wedge ..	—	4·3	7·2	5·2	—	4·5

At this point the instruments were divided into two classes, the results accordingly being treated in two slightly different ways. One of the advantages of instruments in which a reading is obtained by variation of the standard to match the test solution (instruments 4–12) is that several readings may be obtained with a single loading of the instrument, and the mean reading reported. On the other hand, an instrument which depends on the dilution of the test solution (instruments 1–3) can give only one reading from one loading. This difference has been allowed for in the computation. The mean has been obtained, in the case of instruments 4–12, of each set of three ratios, by each observer on each instrument for each sample of blood; these means were then used for the final stage. With instruments 1–3, however, each of the 6144 ratios has been treated independently in the final stage.

This final stage consisted of the calculation, for each instrument, of the mean and standard deviation of the figures (ratios or means) derived from that particular instrument. To make comparison between instruments independent of the different numerical values of the ratios, the results have been expressed as coefficients of variation (C.V.) defined as $\text{C.V.} = \frac{100}{\bar{x}} \sqrt{\frac{\Sigma(x-\bar{x})^2}{N-1}}$ where the symbols have the usual meanings (table IV).

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From these ratios an estimate can be made, for any particular instrument, of the smallest difference in readings which can confidently be held to represent a true difference in hæmoglobin content, and not merely the random variations due to imperfections of the method or observer. The "error quantities" have been calculated so that the probability of random variations producing differences greater than the error quantity is less than 0·05. This is important in clinical work, since it is often desirable to know whether the hæmoglobin content of a particular patient is changing or not. It can be stated that, unless the difference between two estimations is greater than the "error quantity" of the method used, reliance should not be placed on the significance of the difference.

These "error quantities" have been obtained for each of the methods used in the present investigation. It is well known that with many hæmoglobin methods a single observer can produce more consistent results than can a group of observers. Two error quantities have been computed in slightly different ways: the first represents the smallest necessary difference if both estimations are done by a single observer (assumed to be of average capabilities); and the second represents the smallest necessary difference if both estimations are performed not by the same observer but by any two unselected persons in the group. For most methods the first error quantity is smaller than the second (see figure).

INVESTIGATION IN LONDON

The general lines on which this part of the investigation was planned are very similar to those described above. Only points of difference are therefore described.

Observers were members of the laboratory staff, trained in colorimetric methods. Three observers read each solution in each instrument.

Samples of blood were subsamples of those used for the work described above. The preparation of the solutions and the other details were as already described.

Methods.—Five different instruments were used:

(1) *Duboscq (colorimeter).*—The Bausch and Lomb biological type instrument was used. The test solutions were matched against standard solutions which, in the case of cyanmethæmoglobin and carboxyhæmoglobin, were prepared from the first subsample of the investigation. The standard for the alkaline hæmatin method was prepared from crystalline hæmin by the method of Clegg and King (1942).

(2) *Duboscq (photometer).*—The same instrument was used, with an Ilford mercury green filter over the eye-piece, but in place of the standard solutions a neutral grey screen (D = 0·41) was used, as described by King et al. (1937). In both of these methods the usual precautions against systematic errors were taken by interchanging the two sides of the instrument.

TABLE V—COEFFICIENTS OF VARIATION FOR VARIOUS INSTRUMENT/PIGMENT COMBINATIONS TESTED AT POSTGRADUATE MEDICAL SCHOOL OF LONDON

Instrument	Blood derivative					
	Whole blood	$Hb.O_2$	Hb.CO	Cyanmet. Hb	Acid hæmatin	Alkaline hæmatin
Duboscq (colorimeter)	—	—	5·2	2·8	—	2·4
Duboscq (photometer)	—	2·6	2·6	3·2	2·6	3·0
Sahli-Zeiss ..	—	—	—	—	4·9	—
Grey wedge (straight)	—	—	2·8	5·1	—	4·1
Grey wedge (circular)	—	5·1	5·8	3·9	4·1	4·7

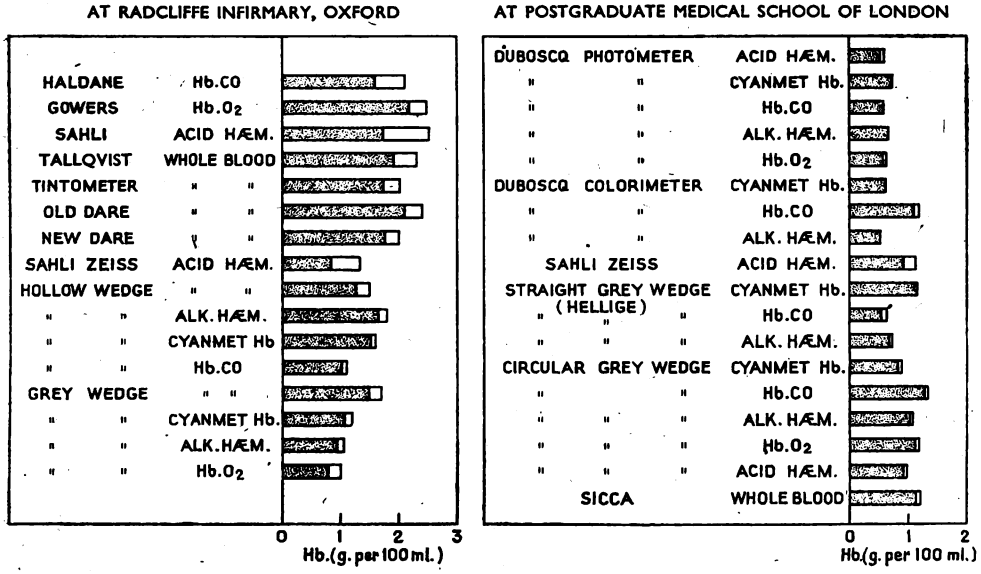
(3) *Sahli-Zeiss* similar to method (8) of the first part.

(4) *Straight grey wedge* similar to that described in the first part.

(5) *Circular grey wedge.*—This instrument, described by King (1947), is the same in principle as the preceding one but differs in the shape of the neutral grey wedge, which forms a ring. Any desired part of the wedge can be brought into the optical field by rotating the housing of the wedge; the match point is read off in degrees. The solution was contained in a test-tube.

Experimental Procedure.—Each subsample, when received from Oxford, was well mixed, and part was set aside for the iron determination. This was done according to the titanous chloride method of Delory (1943), the accuracy being checked against solutions of pure iron wire. From the remainder, solutions of the various blood derivatives were prepared as already described. Observations were then made in a similar fashion.

Results were analysed by a method exactly similar to that used for the observations of the first part. They have been expressed in a similar fashion (table v and figure). No dilution instruments were used.



"Error quantities" for the various instruments tested. Stippled rectangles represent that quantity relating to a single observer of average capabilities; whole rectangle (stippled + white) represents that found when any two unselected observers perform the estimations. For explanation see text.

DISCUSSION

The experiment was so planned, with the help of Prof. R. A. Fisher, that the various factors concerned in producing the over-all variability of the results of hæmoglobin estimation by several observers could be assessed separately. In this paper, however, the results of such an analysis are not given, because the main concern now is the general reliability of the methods studied and not the various factors concerned in errors. Though the observers were carefully selected to make an analysis of their personal factors possible, they may be regarded as a group fairly represen-

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tative of the sort of people likely to use the methods in practice.

The most serious criticism of the experiment might be that the use of an indirect method for determining hæmoglobin as a basis of the colorimetric procedures added another source of error. Such a basis had to be found, however, unless all observations were made on only one sample of blood, which would have provided only partial information. Macfarlane (1945) relied on colorimetric estimations in the National Physical Laboratory (N.P.L.) comparator as a basis for examining the reliability of the Haldane-Gowers method, but only carboxyhæmoglobin was being used, and the standards used by observers and the N.P.L. were almost identical. In the present experiment different pigments and standards were involved which could not fairly be related to any one basic colorimetric determination. It can be said, also, that the errors of iron determination are small in comparison with the errors of visual hæmoglobinometry.

As regards the results, certain important indications emerge. First, the dilution methods in common use (Haldane, Gowers, and Sahli) are, on the whole, less reliable than other methods. In all, even with a single "average" observer, differences of 10% or more must be found before they can be regarded as significant. This finding is not unexpected, since the dilution method allows of a colour change in one direction only, provides bad conditions for colour matching, and involves technical errors of reading and mixing. Of the three methods the Haldane is the best. There is a greater variability when different observers use the Sahli method than in any other, possibly because the colour of acid hæmatin is found difficult to match by some. The Gowers method suffers from the fact that the artificial standard has considerable colour difference from the oxyhæmoglobin solution it is supposed to match.

The methods using whole blood are, on the whole, slightly better than the dilution methods, but it is instructive to observe that the simplest (Tallqvist) is not much worse than the elaborate and expensive Dare 1. The use of a prismatic eye-piece and artificial illumination improves the performance of the more modern Dare 2 to some extent. The use of whole blood, though it avoids the necessity to measure the volume of the sample of blood and its dilution, is attended by considerable error due to uneven fields and is, in practice, rather troublesome because of the difficulty in cleaning and filling the capillary cells. Method (8), the Sahli-Zeiss, is by far the best of the proprietary methods. The improvement over method (3), also using acid hæmatin, is presumably due to the use of the well-designed comparator, which uses a wedge standard and a prismatic eye-piece.

The Duboscq type instrument, used either as a colorimeter or as a photometer, yielded much more precise results than did any of the clinical instruments except the Sahli-Zeiss.

With the experimental methods the photometric principle appears to be generally superior to the colorimetric. The construction of the two different instruments was similar, both optically and mechanically, a straight neutral grey wedge and filter being substituted for the hollow glass wedge of the colorimeter. The best performances recorded at Oxford were with oxyhæmoglobin and alkaline hæmatin, estimated in the neutral grey photometer, the significant differences for the average observer being slightly more than 4%. At the Postgraduate Medical School of London all the hæmoglobin derivatives tested gave good results in both of the two grey wedge instruments used; but there is a curious difference in performance in two cases, the straight wedge being better than the circular with carboxyhæmoglobin, and the reverse with cyanmethæmoglobin. Improvements in design of the circular grey wedge photometer have greatly improved its accuracy and its ease of use. These later models will be reported on in a further communication.

SUMMARY

An experiment is described to determine the precision of different methods of hæmoglobin estimation, some in clinical use and others experimental.

Tables are given of the performances observed and of the minimal difference in hæmoglobin concentration which each instrument can detect.

The bearing of the results on the design of efficient instruments is briefly discussed.

This investigation has been carried out for the Medical Research Council's subcommittee on analytical methods. The expenses incurred were partly defrayed by a grant from the Medical Research Council, to whom grateful acknowledgment is made.

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CRUSH SYNDROME AND TRAUMATIC URÆMIA

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CRUSH syndrome, first widely recognised amongst air-raid casualties in 1942, was considered to be a state of renal failure caused by a special type of injury, usually one in which the circulation to a limb was occluded for some hours. The signs which followed release were swelling, paralysis, and anæsthesia of the limb, the sudden onset of severe shock, oliguria or anuria, myoglobinuria, nitrogen retention, "uræmia," and usually death.

The discussion which has ensued has tended to associate the syndrome with incompatible blood-transfusions and blackwater fever because of the excretion of blood-like pigment; with "transfusion kidney," mercurial poisoning, and sulphonamide anuria because of the tubular degenerative changes and urinary casts; with traumatic shock because of the diminished renal blood-flow; with traumatic uræmia because of the nitrogen retention; and with vasospasm because arterial injury has been described as the cause both of local muscle necrosis and of reflex anuria.

As an illustration of the syndrome the following hitherto unpublished case is described.

Case 1.—A man, aged 31, was admitted after an air-raid in 1942, having been buried for six hours with great pressure across the top of both thighs. He had no other injuries. The skin of his thighs and lower abdomen showed pressure marks; his legs were paralysed and partially anæsthetic and within a few hours became swollen and tense. Pulsation was present in the main vessels.

Progress was characteristic. Sudden collapse with imperceptible pulse occurred, and it was not for twenty-four hours

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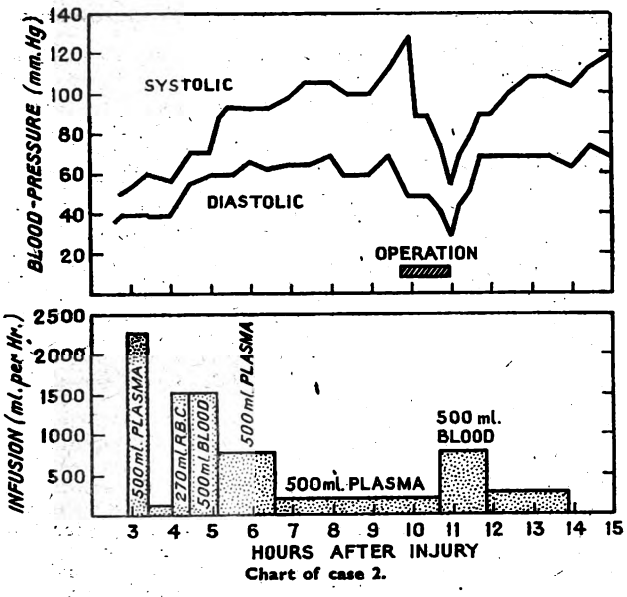

Chart of case 2.

that his blood-pressure rose from the danger level below 90 mm. Hg. He had received by that time 1000 ml. of normal sodium bicarbonate, 1000 ml. of 5% glucose, 1500 ml. of plasma, and 500 ml. of sodium sulphate intravenously.

On the first day 230 ml. of urine was excreted; it was brown and contained a deposit of brown pigment identified as methæmoglobin—it is now known that it was probably metmyoglobin—but there were no casts.

Blood: 35 hours after release contained, per 100 ml., urea 56 mg., creatine 13·7 mg., creatinine 5 mg., and phosphorus 14 mg. Four hours later it contained, per 100 ml., urea 75 mg., CO_2 76 vols., chloride (as NaCl) 347, and sodium (as NaCl) 309. There was no response to intravenous therapy, and patient died after 71 hours, having excreted only 400 ml. of urine.

Attempts to find the cause of renal failure in crush syndrome have led to two main hypotheses: (1) that the crush damages muscles and liberates a toxin harmful to the kidneys; and (2) that the kidney damage is the result of anoxia either from prolonged low blood-pressure or from reflex renal "shunt." If the toxin theory is accepted, myoglobin must probably be excluded and a hitherto unidentified breakdown product of muscle postulated, a substance often appearing coincidently with the myoglobin, but, as the cases described below suggest, not always. This hypothesis suggests that crush syndrome and traumatic uræmia are similar lesions and that the myoglobinuria is a coincidence.

The following are the details of a case of traumatic uræmia.

Case 2.—A man, aged 47, had received a fractured pelvis, extraperitoneal rupture of bladder, two fractures of the femur, and a fracture-dislocation of the clavicle in a road accident. His progress during the first day is shown in the accompanying figure.

During the next five days he became progressively "dehydrated" in appearance and developed "uræmia." Paralytic ileus developed on the fourth day, and he died on the sixth day. There were no casts at any time in the urine and no albumin in the first specimen. His urinary output, blood-urea, and intravenous infusions were as follows:

Day	1	2	3	4	5	6
Urine volume (ml.)	110	230	60	680	No record	1810
Blood-urea (mg. per 100 ml.)	..	210	..	190	..	350
Intravenous infusions of NaCl, Na_2SO_4, and glucose (ml.)	..	..	2000	1500	3000	..

Sections of the kidneys taken from the cadaver revealed changes which, though moderate, corresponded with those described in crush syndrome and in incompatible transfusion—eosinophil material in glomeruli; catarrhal changes in tubules, most marked in the ascending loops of Henle; granular, hyaline, or pigmented material in the lumina; occasional collections of red cells; and interstitial œdema.

Case 2, typical of its kind, might in its several points of similarity be considered to correspond to the renal part of the crush syndrome without the myoglobinuria. Can the other part of the syndrome occur separately—myoglobinuria and muscle damage without renal failure? Case 3 seems to provide an answer.

Case 3.—A man, aged 30, was injured in a road accident, receiving a severe head injury and a fracture of the pelvis. The right external iliac artery was involved, being caught between the fragments of the superior ramus of the pubis. The pulse was absent in the right leg, and the limb lay white and cold. It was paralysed and anæsthetic below the knee. No improvement resulted from injection of local anæsthetic into the lumbar sympathetic trunk.

On the second day signs of recovery were apparent, and at the same time patient became continent of urine, and a specimen was obtained for testing. The urine was brown. Later specimens proved it to be typical of that excreted in crush syndrome; it contained metmyoglobin (proved spectroscopically), granular pigment, occasional granular, epithelial, and hyaline casts, and creatine, a product of muscle breakdown, 0·46 g. per 100 ml.

Forthwith a strict watch was kept for signs of renal failure, but the output of urine never fell below 600 ml. a day, and tests did not reveal any evidence of renal damage:

Day	4	5	6	8	13
Urine volume (ml.)	620	600	1420	680	..
Urine urea (g. per 100 ml.)	4·7	..	6·4	..	..
Blood-urea (mg. per 100 ml.)	48	52	48	..	35
Blood-chloride (mg. per 100 ml.)	475	..	480	480	..

Van Slyke urea-clearance test gave clearances of 172% and 158%. Blood-pressure remained normal.

Changes took place in the leg which left no doubt that ischæmic necrosis of muscle developed: the calf became painful and tensely swollen; by the third week it was wasted and still paralysed though the skin-anæsthesia was receding; by the sixth week the muscles were consistent with those of a Volkmann's contracture.

Original descriptions of crush syndrome [1] compared with those of traumatic uræmia [2] confirm the widely accepted suggestion that they are identical conditions, at least as regards the renal lesion. However, the conclusion suggested by case 3 is that the distinguishing feature of crush syndrome—the chocolate-brown urine—is not the essential feature but only an indication of anoxic muscle damage of a particular degree and duration occurring often coincidently with the renal lesion but sometimes without it.

These cases are published by permission of Prof. A. P. Thomson and Mr. J. B. Leather, under whose care the patients were treated.

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". . . Under normal conditions it is probably best for a student to do the whole of his undergraduate work in his own country. If it is necessary that he should study abroad, however, it would be better for him to follow a foreign curriculum in its entirety than to do part of his work at home and part abroad; the reason is that in any country a university course is planned as a whole and it may be disturbing to the student to have to change from a native to a foreign curriculum. While foreign study by undergraduates must be viewed with reservations, no reservations are necessary regarding foreign study by young graduates; a year abroad is the crown of a university education and an investment that will yield steady dividends throughout the graduate's life."—Dr. RAYMOND WHITEHEAD, *Norseman*, 1947, **5**, 11.

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CHRONIC BILATERAL SPONTANEOUS PNEUMOTHORAX

DIFFICULTIES IN TREATMENT

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No less than 100 cases of chronic bilateral spontaneous pneumothorax have been published, and the natural history of the idiopathic pneumothorax affecting otherwise healthy people—or, as the French sometimes call the unilateral type, *pneumothorax des conscrits*—has been so well described by Kjaergaard (1932), of Copenhagen, that the object of this paper is not so much to add any clinical details but to record some of the difficulties in treatment.

CASE-RECORD

A man, aged 31, was admitted to hospital on Oct. 22, 1946. He had had a cough all his life, and in 1944 was boarded out of the Army with chronic bronchitis. He was first radiographed in 1942, after a sudden attack of pain in the chest. The radiogram was reported as normal except for a round opacity in the left lower lobe that had remained unchanged until his present admission. He had a similar attack of pain on Nov. 2, 1943, and this time a right pneumothorax, which lasted three weeks, was discovered by radiography.

In January, 1946, he had a further attack of dyspnœa and chest pain while walking, and radiography revealed a bilateral pneumothorax. He was in hospital for eight months, and when the lungs had expanded he was put on light work. On Oct. 22, 1946, after another attack of more severe dyspnœa while walking, he was admitted to the Queen Elizabeth Hospital, where radiography showed a recurrence of the bilateral pneumothorax (see figure).

On admission he was not unduly distressed, though slightly cyanosed, and he was well built and healthy apart from a chronic cough. There was no finger-clubbing or pyrexia, and his pulse-rate was 90 per min. There were no abnormal physical signs apart from the pneumothorax and no evidence of a bronchopleural fistula. Six examinations of the sputum were negative for tubercle bacilli, and the erythrocyte-sedimentation rate was 10 mm. in one hour (Westergren).

Treatment.—During the first month air was repeatedly aspirated from the right pleural cavity, at first in small amounts, later up to 2000 ml. Pressure readings were always slightly on the negative side, an example being right chest −5, 0; left chest −7, −1. A study of these suggested that there was an intermittent leak on the right side, and this was confirmed by analyses of the pleural air, one set of figures being: carbon dioxide 2·73%, oxygen 11·73%, nitrogen 85·54%. There was nothing to support the possibility of a congenital or other communication between the pleural cavities.

Thoracoscopy.—Since there was no indication of the hole in the visceral pleura becoming closed naturally, a right thoracoscopy was performed under local anæsthesia by Mr. A. L. d'Abreu on Nov. 26, 1946. This showed a normal pleural cavity without any adhesions, and there were no emphysematous bullæ; but an area at the apex of the lung which suggested the presence of a fistula was sprayed with 8 minims of 1% silver nitrate. In spite of repeated aspirations of air to keep the pleural cavity empty and to allow pleural synthesis to take place, radiography on Dec. 2 showed that the treatment was a failure.

Attention was then directed to the other side, which was emptied of air and had 1 oz. of 15% glucose injected into it. After this the cannula of an artificial-pneumothorax induction needle was inserted into the 3rd interspace anteriorly, where it remained three days, being changed every twelve hours to avoid infection. The cannula was connected to an electric pump. Though the lung became fully expanded it did not remain in this position; so this method also proved a failure.

A study of the radiograms then suggested that the leak was at the apex of the left lung, and that, though it was possible to bring about complete expansion of the lower parts of the lungs, a small apical pneumothorax tended to remain and then to promote separation of the rest of the pleural space. The site for any cannula should be immediately over the pleural fistula.

On Jan. 17, 1947, Mr. d'Abreu inserted a catheter into the apex of the left pleural cavity, under local anæsthesia, through a small incision posteriorly over the second intercostal space medial to the vertebral border of the scapula. Continuous suction was maintained for fourteen days until the pleural space was obliterated. Obliteration was confirmed by discontinuing the suction and leaving the tube open to atmospheric pressure. Repeated screening over forty-eight hours showing no tendency for the lung to collapse, the tube was removed.

Pleural synthesis was later produced in the right lung by the same technique. The tube on this occasion was inserted at a lower level through the 6th interspace posteriorly, and it had to be left in for twenty-seven days before screening proved that it was safe to remove it. This may have been a result of the less accurate proximation of the tube and the pleural fistula.

A symptomless collapse of the right lower lobe was found by radiography at this time, but re-expansion took place after twelve days.

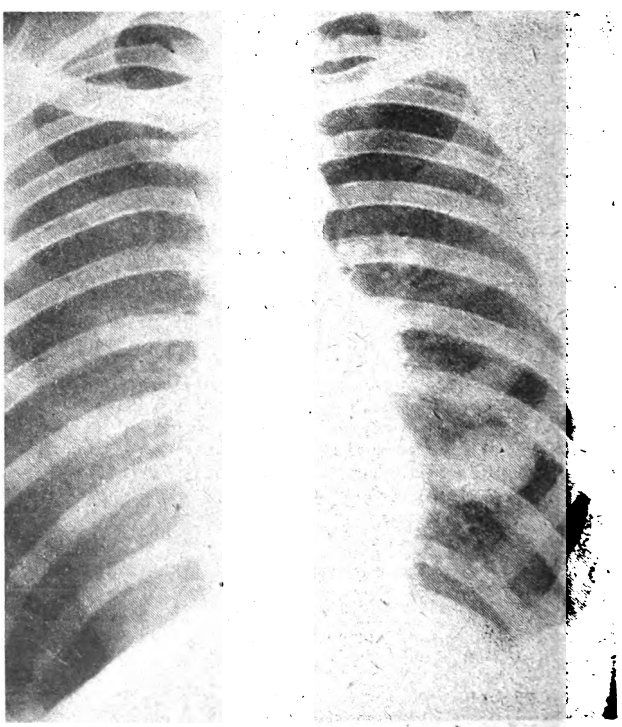
The patient was quite comfortable with the pleural tube in position, provided suction was maintained at low pressures only. He developed a fever of 100°F on each occasion for three days, but this subsided without chemotherapy.

The round opacity in the left lower lobe has remained unchanged for five years, and was considered to be unrelated to his present condition. It was thought to be either a benign tumour or a lung cyst, but no excuse could be found for interfering with it. Aspiration biopsy was contemplated but, since there seemed to be a remote possibility of its being a hydatid cyst, in spite of the Casoni test being negative, this was not done.

The patient has now returned to work and feels quite fit. Radiography on Nov. 6, 1947, showed normal lung fields, except for the same round opacity, with no evidence of pneumothorax.

DISCUSSION

This patient probably belongs to the group of cases in which the pneumothorax results from the rupture of a subpleural air vesicle. This may be either an emphysematous bulla or of the kind described by Hayashi (1915) where local scar tissue weakens the visceral pleura and distorts a small area of lung tissue



Radiogram showing recurrent bilateral pneumothorax.

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giving a valvular opening into a subpleural air sac. Necropsy studies of the latter group indicate that rupture usually takes place at the apex of the lung where old scar tissue is more likely to be found. For many years tuberculosis was held to be the cause of these benign cases, in spite of absence of bacteriological and radiological evidence of tuberculosis, and it was Kjaergaard (1932) who by his careful follow-up records dispelled this myth. As a rule these people continue in perfect health but are liable to further attacks, the recurrence-rate being placed by Kjaergaard as high as 20%.

Bilateral pneumothorax, however, is not an uncommon complication of pulmonary tuberculosis. Glickman and Schlomovitz (1936), in their review of 82 cases, state that 38% were due to this cause. Other factors were bronchopneumonia (2·5%), pneumoconiosis (9%), congenital cysts (3%), and tumours (2·5%). In this series the type due to rupture of air vesicles accounted for 33% of the cases.

The clinical features described here are mild and very different from those described by some other workers. King and Benson (1944) have reported a fatal case where the patient died from asphyxia, and Komrower (1947) has shown that repeated withdrawal of air from both pleural cavities will save these people. No urgent measures of this kind were necessary in the present case; the problem was to produce permanent expansion of the lungs by pleural synthesis, thus restoring the patient's vital capacity and saving him from further attacks. This proved difficult because the pleural opening did not seal itself.

The methods of dealing with this failure to seal can be illustrated by the following 4 cases of chronic pneumothorax, all unilateral and non-tuberculous, that have come under the care of Dr. Brian Taylor. In one case, of fifteen years' duration,* the lungs did not expand, and, since the condition of the man, who was 75, was extremely bad, the treatment here described was not adopted. In two other cases the lungs expanded after thoracoscopic division of adhesions holding open a fistula, and the fourth case needed thoracotomy and suture of the hole, a procedure which could not reasonably be undertaken with both lungs collapsed. The intercostal tube, brought as near as possible to the opening in the visceral pleura, which being at the apex was approached high up in the back, was used to aspirate the air and to keep the pleuræ in contact long enough to allow adhesions to form, probably as the result of irritation of the tube. Then the tube was removed.

These difficulties were unusual, for in most cases spontaneous pneumothorax responds well to treatment. Brock (1943), who has described the technique of the production of aseptic obliterative pleuritis by the intrapleural injection of silver nitrate, and Gowar (1941), using Bethune's (1935) method of "pleural poudrage," where iodised talc powder is insufflated under thoracoscopic guidance, both emphasise the simplicity and safety of the procedure. It must rarely be necessary to risk introducing sepsis by using intercostal catheters, which fortunately, in this case, proved most successful.

SUMMARY

In the case of chronic bilateral simultaneous pneumothorax described the symptoms were mild but they recurred over a period of five years.

The pneumothorax probably resulted from rupture of bilateral subpleural air vesicles.

Unusual difficulties in performing pleural synthesis were encountered, but synthesis was finally achieved by continuous suction through intercostal tubes.

* Perry (1939) recorded a case of chronic pneumothorax observed over twenty years.

I wish to thank Dr. Brian Taylor and Mr. d'Abreu for their helpful criticism and permission to describe this case.

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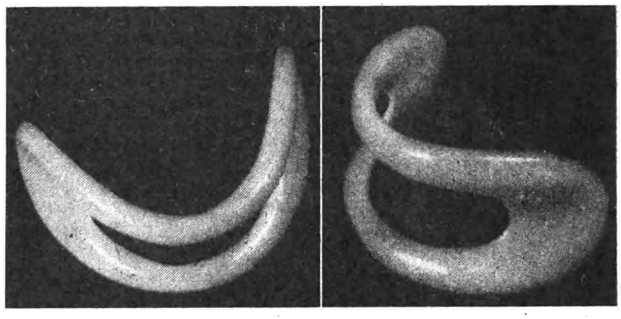
New Inventions

BUCCAL SUPPORT FOR ADMINISTRATION OF ANÆSTHETICS TO THE EDENTULOUS

IN edentulous patients the induction and maintenance of anæsthesia are often rendered difficult through lack of the support normally given to the lips and cheeks by the teeth and alveolar margins. When a person has been edentulous for several years, the alveolar ridge becomes depressed and atrophic, until the soft tissues of the mouth may offer a serious obstruction to respiration. It is also often impossible to fit a face-piece accurately without severe pressure on the nose, eyes, or chin, and a pharyngeal airway tends to slide about in the mouth instead of lying snugly on the dorsum of the tongue. Occasionally these factors are serious enough to necessitate administration of the anæsthetic by the endotracheal route.

The buccal support illustrated was designed to overcome some of these difficulties and has been found very useful. It is made of acrylic resin and from an impression



taken of the anterior surface of the alveolar ridges of an edentulous young man. The central orifice was made as large as possible consistent with strength, so that there should be no narrowing of the natural passage and the insertion of a pharyngeal airway should be easy. The support is very strong and can stand a remarkable amount of ill treatment; hence the danger of breakage in the mouth is remote. Only one size has been made, and it has been found adequate for all the R.A.F. and W.A.A.F. personnel on whom it has been used. Children and small women may require a smaller pattern.

The support is fitted into the mouth, either before or soon after induction of anæsthesia, so that it lies in the sulcus between the lips and cheeks and the buccal surface of the gums; thus no amount of clenching of the jaw prevents its insertion, and there is little risk of damage to the gums or any remaining teeth. A face-piece can be accurately and loosely fitted, as in the normal patient.

The only drawback noted has been a tendency for the support to slip out of position when the alveolar ridges are very atrophic, but this has been corrected in all cases by supporting the jaw in the usual manner. Because of its shape and size the support cannot slip back any distance into the throat, and it is easily removed by hooking a finger round one of the cross-bars.

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Late Flight-Lieutenant, R.A.F.V.R.
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Reviews of Books

Formen und Ursachen der Herzhypertrophie bei Lungentuberkulose

Prof. W. BERBLINGER, Schweizerisches Institut für Hochgebirgsklima und Tuberkulose in Davos. Berne: Huber. 1947. Pp. 183. Sw. fr. 10.20.

IN this monograph on cardiac hypertrophy in chronic pulmonary tuberculosis Professor Berblinger has broken new ground. At the research institute in Davos he has correlated his observations on healthy people with those derived from patients suffering from fibrotic diseases of the lung in which the pulmonary circulation is embarrassed. The investigations were made on post-mortem material by an elaboration of the method introduced by Wilhelm Muller last century and developed by Lewis, Cotton, and Hermann and Wilson in the early volumes of *Heart*. After removing the epicardial fat and weighing the heart muscle, Professor Berblinger estimates separately the weight of the muscle of right and left ventricles and the interventricular septum and from these figures calculates heart and ventricular indices. His material consists of 279 hearts obtained at autopsy, of which 254, which form the basis of study in the monograph, were from adults (184 males and 70 females). These include 138 cases of chronic pulmonary tuberculosis. Examples of valvular disease, endocarditis, and silicosis which mechanically increase the overload of the right heart are also recorded. By way of comparison and control weight estimations from a series of hearts obtained from healthy persons killed in accidents (including athletes) are included, as well as a small number of hearts from other diseases such as emphysema and Addison's disease. The tables do not admit of a satisfactory summary, but they yield a mass of statistics which should be of great value to morbid anatomists who wish to study the heart in chronic pulmonary tuberculosis. Apart from general clinical observations and electrocardiographic records very little work has been done upon this subject, and pathologists are indebted to Professor Berblinger for his years of painstaking labour in elaborating an exact technique, and in providing basic data on which to work. Incidentally, the effect of high altitude (Davos is 1550 m.) on cardiac hypertrophy as estimated by the author's methods does not appear to be as noteworthy as some physicians have supposed.

Biological Standardisation of the Vitamins

(2nd ed.) KATHARINE COWARD, D.SC., reader in biochemistry, University of London; head of the nutrition department, Pharmaceutical College. London: Baillière. 1947. Pp. 224. 16*s*.

RECENT advances in chemical, microbiological, and physical methods for the assay of vitamins have been so considerable that animal methods are liable to be dismissed as unnecessarily complicated and time-consuming, and consequently outmoded. For some vitamins, however, particularly vitamin D, there are no methods available other than those based on the effect on animals. Moreover, chemical and physical methods are often not very specific, and workers have always to be on their guard lest the effects they observe are due to substances other than the vitamin concerned. Again, since vitamins are mainly important because of their effect on the nutrition of animals, there is much to be said for using effects on animals as a basis for their assay.

The second edition, after ten years, of Dr. Coward's book thus comes at an opportune moment. It gives a short but detailed account of most of the animal methods which have been used for the determination of vitamins A, B_1, C, D, and E, and includes a section on the general care of laboratory animals, which will be useful to anyone who has had to build up animal colonies for nutritional work. Many examples of experimental results are given, together with the calculations necessary for evaluating them. The variation between animals, even those of the same litter of a highly inbred strain, is very great, and in order to allow for these differences it is essential to plan experiments carefully and to determine how far differences between groups are due to the factor which is being studied. Throughout, Dr. Coward lays stress on the proper use of modern statistical methods, an account of which takes up the last quarter of the book. She rightly confines her attention, however, to those methods which in her hands have proved useful, including such recent developments in statistical analysis as the estimation of fiducial limits of error. No doubt some nutritionists have their own pet statistical formulæ, but for workers who have only slight training in the subject the account given here is both clear and sufficient.

The Psycho-Analytical Study of the Child

Vol. II, 1946, an annual. Editors: ANNA FREUD, WILLIE HOFFER, M.D., PH.D., EDWARD GLOVER, M.D., and others. London: Imago Publishing Co. 1947. Pp. 424. 30*s*.

THIS is the second volume of an omnibus collection of papers from a group of psycho-analysts of the Freudian school, in England and America. The first volume, dated 1945, appeared in 1946. The individual contributions are of a high order; but articles of general interest jostle others of a highly specialised and technical character which cannot interest the general reader, though they may arouse his scepticism or hostility. Moreover psycho-analytical writers commonly fail to present their material in a scientific way. A glaring omission in this volume is of any description of the type of patient under discussion: horror upon horror is disinterred from the hidden recesses, but no-one tells us whether they come from a mind that would pass as normal, or from a grossly distorted personality. It is time we had a little quantitative information. If every child is so preoccupied with hate, rage, mutilation, and slaughter, then propagation of the race must seem a misguided enterprise. Nevertheless, the ordinary reader, looking at his sons or grandsons, nephews, or nieces, finds it hard to believe that death and destruction play a leading part in their lives.

For the ordinary reader, Dr. Margaret Fries, writing on the child's ego development, discusses sensibly the practical problems in the psychological care of children in their early years. Dr. Rene Spitz, on hospitalisation, continues the study he began so well last year on the effects of separating young babies from their mother; and adds some more valuable observations in an article forbiddingly called "anaclitic depression." Dr. Kate Friedlander, who deals with psycho-analytical orientation in child guidance, inclines in practice to less and less clinical psycho-analysis but more and more propaganda and education to parents and others on the principles of bringing up children, based on common sense, careful observation, and a humane outlook.

Certain concepts of psycho-analytical theory have by now become part of the mental furniture of most educated people, and most would agree that a rational practice of upbringing can be based on what psycho-analysis has revealed of the storms and stresses in the infant mind. But nothing probably staggers the newcomer to child guidance so much as the great gulf between the principles adopted by the educated and well-to-do and those of the less taught and less comfortable classes. There used to be as great a gulf in the matter of physiological principles, but, as Dr. Fries points out, this is now on the way to being closed. What is being done for physiology can be done for psychology; and for the psychiatrist interested in social medicine this is the most important theme in this volume.

The Essentials of Modern Surgery (3rd ed. Edinburgh: E. & S. Livingstone. 1948. Pp. 1256. 50*s*.).—That this book provides what the average student wants is evident from the constant demand for it since its first appearance. In this new edition Mr. R. M. Handfield-Jones and Mr. A. E. Porritt have added chapters on chemotherapy and several sections on operative surgery, including amputations. The subject of anæsthesia has been omitted—wisely, since no adequate account of it could be given without describing detailed technique, which would make the section too long and unbalance the book. It remains an up-to-date textbook for undergraduate students and has the advantage, for them, of being dogmatic in its teaching. But students for higher examinations, too, will find it useful, and—with a little supplementary reading—sufficient.

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THE LANCET

LONDON: SATURDAY, FEB. 21, 1948

The Plebiscite

LAST week Mr. BEVAN secured a vote of confidence from the House of Commons, and this week the British Medical Association has secured a vote of confidence from the medical profession. The results of the plebiscite, which are set out on another page, should more than satisfy the hopes of the B.M.A. leaders, for their majority is overwhelming. Of 45,549 votes received by last Monday afternoon only 4735, or about a tenth, expressed approval of the National Health Service Act. Since hardly anyone can be expected to approve of every word of the Act, this might not in itself mean much; but the answers to the more important questions are almost equally conclusive. Of the doctors most directly affected by the introduction of the new scheme—namely, consultants and specialists, general practitioners, and those working whole-time in voluntary hospitals—only 4084 out of 29,424 were in favour of service under the Act, and 24,066 out of the 28,560 who answered the question agreed to refuse such service if advised to do so by the B.M.A. Since these 24,066 included 14,177 general practitioners and 2104 assistants, this majority comfortably exceeds the minimum which the B.M.A. council thought necessary if active resistance was to be attempted.

To the B.M.A. leaders the magnitude of their victory will be a source of strength. We do not yet know just what their objective is, nor how they intend to reach it; but if they wish to avoid needless conflict, and are prepared to enter into negotiations with the Government to that end, the plebiscite gives them a strong position from which to do so. On the other hand, the existence of large belligerent majorities on both sides will not make it easier for negotiators to accept the kind of compromise which the public interest requires.

Streptomycin Needs

THERE is a pressing need of more streptomycin and of more beds for streptomycin treatment. It is too soon to expect definite results from the Medical Research Council trial, but it seems clear that some 25–35% of cases of tuberculous meningitis treated with streptomycin will be apyrexial, and will have a normal or nearly normal cerebrospinal fluid, at the end of four to six months; the outlook is much better over than under three years of age. Many of the patients who respond to treatment are showing some psychical disturbance which may or may not prove permanent—it is hoped that most of them will return to full health, but there is a disappointing tendency to relapse, even months after apparent recovery. In miliary tuberculosis the outlook is brighter; in many cases, particularly the more acute ones, there is a spectacular clearing of signs in two or three months, by which time about half the patients treated will be classed as "doing well"; but here again there is a serious risk of relapse, sometimes with the development of meningitis. Much has still to be learnt about dosage and technique—thus in meningitis combined intrathecal and intramuscular administration seems much more effective than intramuscular alone—and the primary aim must be to get as much information as possible with the supplies and beds available.

The plan by which doctors submit cases for the official trial either direct to the participating hospitals or, in the London area, through the Emergency Bed Service (E.B.S.) has worked well since it was introduced last August. Suitable patients have been forthcoming to fill vacancies in the trial beds as they have arisen, and the distressing broadcast appeals for streptomycin have no longer been heard. Moreover, in the London area at any rate, up to the end of December it had been possible to include in the trial nearly all the suitable patients submitted. Thus, in the four months September–December, the E.B.S. found places for 62 cases of tuberculous meningitis and 76 cases of miliary tuberculosis, while 17 patients submitted died before admission or were found to be too advanced or otherwise unsuitable for the trial. This year, however, the position has become less satisfactory from the individual patient's point of view, largely because, with so protracted a course of treatment, beds cannot be cleared as quickly as new cases arise. In January, too, there was a sharp increase in the cases submitted through the E.B.S. following a broadcast announcement of additional beds being allotted to the trial, making a total of 200. In that month the E.B.S. was asked to find places for 60 patients, including 32 meningitis cases, and on Jan. 31 there were still 10 suitable cases for which no places could be found. Since priority is rightly given to early cases these patients are now unlikely to be chosen for streptomycin treatment at all. Unless the 200 beds are considerably increased, the proportion of unsuccessful applicants must continue to rise from now on, as more and more beds are blocked by patients doing well.

How many beds would be needed to provide for all suitable cases of tuberculous meningitis and miliary tuberculosis in the country is unknown. There are about 2000 deaths from tuberculous meningitis every year, and perhaps half of these are of the terminal type in patients with chronic tuberculosis of other parts. If the average stay in hospital of the successful case is six months, then allowing for the many patients who do not respond to treatment some 300 beds would be required for meningitis cases alone and certainly over 100 for miliary cases. The present Treasury grant of dollars for streptomycin provides only enough for the 200 Ministry of Health beds, and the United States still holds what is virtually a world monopoly in production; so this grant would have to be doubled to maintain double the number of beds. If this were feasible it would still be difficult to find the extra beds—with the serious shortage of nurses and long waiting-lists even the present 200 cannot be easily spared. For research purposes the ideal would

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be to set up a 100-bed centre, with a well-qualified junior staff, and a pædiatrician, a neurologist, and (most important of all) a neurosurgeon doing rounds every day. So that beds in this centre would not be immobilised too long there should be a country after-care home for "convalescents" and patients in the later stages of treatment. Such a plan would justify the highest priority in both building and staffing.

Genetic Effects of Atomic Bombing

THE harmful effects of atomic bombing in later generations, resulting from changes induced in the germ cells of survivors, are being studied in the U.S.A. by a committee on atomic casualties set up by the National Research Council. This committee's summary of the present position[1] makes it clear that induced genetic changes in man are extremely difficult to detect, owing to the lack of genetic control of the material and the influence of extraneous variables.

Two principal types of genetic change are to be expected—gene mutation, and chromosome mutation.[2] The former involves no detectable change in the microscopical appearance of the chromosomes and is presumed to arise from intrinsic changes in a gene. Chromosome mutation involves rearrangement of existing genes—for example, by an interchange of segments between two chromosomes—and so may be detected microscopically. The commonest radiation-induced mutations detected in mice are of the chromosome type, and these cause hereditary partial sterility by introducing errors in chromosome distribution during maturation of the germ cells. When a mouse has been irradiated with X rays or neutrons, some of its offspring will consistently produce small litters. About half of the members of these small litters, when mated to normal mice, will in turn give rise to small litters, and so on, the effect being transmitted to about half of the offspring in each generation. The litters are small because a proportion of the fertilised eggs die either before implantation or as embryos. In human beings this effect might manifest itself as a hereditary tendency to miscarriage, inherited through either the mother or the father. Such a hereditary partial sterility is produced when mature sperm are irradiated—the effect on immature sperm is much slighter—so the best chance of detecting this abnormality would be among offspring conceived only a few days after their parents' germ cells had been irradiated. Gene mutations, however, are produced, per unit of radiation dose, about as frequently in immature as in mature germ cells. Hence offspring conceived at any time after the irradiation of one of the parents may carry mutant genes. Offspring which receive a mutant gene from one parent will usually receive the corresponding gene in the normal form from the other parent. If the mutant gene is dominant to the normal, the offspring may be expected to show the effect. But mutant genes are much more often recessive to the normal so that the effect of the mutant gene is concealed. Eventually, after a number of generations which depends on the degree of inbreeding but in modern populations will perhaps average 50–100, a conception will occur in which both egg and sperm contribute the same mutant gene, and the mutation will then show itself in the resulting organism.

Mutant genes of the same type as those induced by irradiation arise spontaneously. Indeed, the average population contains considerably more heterozygotes than homozygotes at a given time. Thus DUNN,[3] in discussing the distribution of the rare recessive gene for juvenile amaurotic idiocy in Sweden, gives data suggesting that in the whole population the frequency of heterozygotes is about 0·8% and homozygotes about 0·004%. In a population which is in genetic equilibrium new spontaneous mutations in each generation are balanced by the elimination of a corresponding number of mutant genes through the failure of individuals to reproduce themselves. This is fairly obvious in the case of amaurotic idiocy, where the occurrence of about 4 homozygotes per 100 000 children means that the incidence of new mutations to the gene determining this highly lethal genotype is about 4×10^{-5} per gene per generation. The effect of radiation-induced mutations will therefore be to add to the input of new mutations in each generation and hence to increase the frequency of their manifestations in the population; ultimately, therefore, they will raise the death-rate from genetic causes.

Since hereditary defects induced by irradiation are indistinguishable from spontaneous ones, and since most of them do not appear in the immediate offspring of the irradiated parents, their detection depends on the difficult demonstration of a statistical change in the incidence of such characteristics in the population. The American committee has devised a programme for the detection of radiation-induced hereditary effects in Hiroshima, Nagasaki, and one or more control areas. It is proposed to establish a system of pregnancy registration, including the irradiation history of the parents. The outcome of each registered pregnancy is to be studied as completely as possible, with periodic examination of the offspring of irradiated persons and with careful death certification. Any abnormal termination of pregnancy or the appearance of a congenital malformation is to be followed up by complete family studies. The difficulties and practical limitations will lie mostly in obtaining the necessary completeness in the records. Congenital malformations in Japanese families may not be reported, particularly as less than 10% of Japanese births occur in hospitals; it is likely to be even harder to obtain trustworthy data on miscarriages. Then there is the need for getting evenly matched teams of investigators for bombed and control areas. Moreover, the inhabitants of Hiroshima and Nagasaki may lose some of their reluctance to report stillbirths and malformations when they learn that these may be attributed to the bombing, whereas this will not apply to the control areas. The programme of investigation must extend over 10–20 years before a significant amount of data can be accumulated, and an even longer period of study, extending to the second and subsequent generations, is probably desirable. If they have

1. Committee on Atomic Casualties. *Science*, 1947, **106**, 331.
2. These subjects are discussed in detail in the report of the London Conference held in May, 1946, recently published as supplement 1 to the *Brit. J. Radiol.* See also *Brit. med. Bull.* 1946, **4**, no. 1.
3. Dunn, L. C. *Proc. nat. Acad. Sci., Wash.* 1947, **33**, 359.

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not already rejected it, the American committee might consider the possibility of studying genes that could be recognised directly in parent and offspring—namely, those determining the blood-group reactions. The necessary teams of skilled serological geneticists might be hard to come by. And, as in all studies of human genetics, there would be doubts about the parentage of some children. However, the discovery of a child with both allels different from the mother's would be clear evidence of an induced mutation.

The Doctor's Income

INFLATION and taxation have combined to change the professional classes from a privileged group, envied for its security, into a beleaguered force, fighting to retain old standards and denied advantages enjoyed by many business men on the one hand and many wage-earners on the other. What is true of professional people is also largely true of the middle classes in general; the *Economist* [1] has tentatively estimated that whereas the average wage-earner is now 10–35% better off than before the war, the purchasing power of a representative salary-earner is about 25% less than it was. Wherever inflation develops, those who earn their living by fees or by salaries and pensions are the last to have their incomes equated to the currency's fallen value, and one of the effects of inflation is to reduce the difference in living standards of the professional and wage-earning classes. However, as the Government's latest white-paper [2] remarks, the "traditional and customary relations between personal incomes in different occupations have no necessary relevance to modern conditions"; and there are many who think that under "modern conditions" further equalisation is desirable. In answer to such arguments a correspondent of the *Economist* points out [3] that inequality of rewards "provides a social dynamic, as inequalities of terrain provide hydro-electric power." For the professions, moreover, there are additional reasons for special treatment by the community. Today—

> "the professional classes are not actually starving or barefoot. But it is not consuming power alone which has suffered; it is, above all, leisure; and it is precisely the characteristic of intellectual work, particularly in its higher grades, that to be properly done it must have a certain amount of leisure surrounding it . . . outside actual working hours, when the professional man used to find time for the exchange of ideas, the cultivation of the humanities, voluntary social work, civic activities, and the attainment of that mental perspective in which alone the specialisations of professional life can be seen in true proportion, there is now merely the solitary struggle with the day's overspill from office or consulting room, and a multitude of domestic odd jobs. This is not a favourable climate for creative advances in any field—administrative, academic, scientific, or cultural. And however low the abstract deserts of the professional, creative progress is not lightly to be sacrificed." [4]

Thus the case for preferential treatment of the professions is based on its value, first as an incentive, and secondly as a means of providing an environment favourable to their kind of work.

Assuming that members of the professions should have a higher standard of living than wage-earners, how should doctors stand in relation to their fellow professionals—teachers, lawyers, accountants, architects, or the clergy? The Spens Committee [5] has rightly observed that the doctor's training is long, his life arduous and short, and his responsibility great; and by way of compensation the doctor has a particular claim to a good environment for his personal life. It may be said that he already has his own rewards, in satisfying work and a measure of prestige; and so long as the work remains satisfying and the prestige is not impaired this will be largely true. But the social importance of paying him well should certainly not be overlooked. In future his income will largely depend on Government decisions; and if this or some succeeding Government were to set the monetary value of his services too low in relation to those of other professions, the standard of British medicine would ultimately suffer. Though there are many exceptions to the rule, it is still broadly true that able men tend to gravitate to well-paid jobs.

Even within the profession itself we need a miniature wages' policy that will attract labour or brains to the points at which they are most useful. Thus the Spens Committee now considering specialists' remuneration has to consider what financial advantages (if any) the specialist should enjoy over the general practitioner. Hitherto the specialist's career has been divided into early lean years and later fat ones; but if in the National Health Service the young specialist is properly paid from the first his claim to a really large income later is less apparent. Again, the specialist's work is on the whole less laborious and more easily confined within fixed hours and places than is the general practitioner's; and it offers other amenities such as better opportunities for research and (for the moment) closer contact with professional colleagues. Clearly we must beware of making the specialist's way of life so attractive as to drain all the talent out of general practice. On the other hand it is equally evident that we must have picked men as our consultants. The consultant's function is to advise the general practitioner; and the advice he offers must be backed not only by experience but by knowledge and aptitude sufficient to command the practitioner's confidence. On specialists, moreover, largely depends the growth of medicine; and all who are capable of promoting that growth should be encouraged to do so. The specialist's higher qualification is in itself some token of ability; and to ask him to work for this hard-won award, and to submit to years of continued studentship, without the hope of eventual advantage over his general-practitioner colleague could only discourage recruitment.

The young specialist or would-be specialist should, we agree, no longer be paid at a rate much lower than that achieved by his contemporaries in general practice. But it is none the less important that after the age of 40 or so the established specialist should still be assured of a rather larger income than that of the general practitioner. No doubt for the exceptionally able practitioner, as for the specialist, there should be exceptional openings, and the two scales would

1. *Economist*, Nov. 15, 1947, p. 790.
2. Cmd. 7324. H.M. Stationery Office. 1948.
3. *Economist*. Jan. 31, p. 173.
4. *Ibid*, Jan. 24, p. 125.
5. Report of the Interdepartmental Committee on Remuneration of General Practitioners. See *Lancet*, 1946, 1, 748.

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overlap; but the specialists' average income should exceed the practitioners', and the peak for specialists should be higher than the peak for practitioners. This claim is supportable not only because of the specialist's greater achievement—proved by his higher degree or diploma and by his appointment, in face of competition, to a senior hospital post—but also because of his peculiar responsibility; and we should not deny that those who have no immediate clinical responsibility might be asked to accept rather lower remuneration than those who have. Finally, apart from the arrangements here indicated, provision should be made for the man or woman of outstanding merit. In any large organisation remuneration tends to be confined to a scale on which the upward steps are marked by age and length of service. Often such a scale offers the young man welcome security, but at the other end it is apt to be too short for those few who are head and shoulders above their colleagues. To such people appointments should be open at salaries transcending all the ordinary scales.

Annotations

THE PATIENTS' HOSPITAL

IN this century the common citizen has come into his heritage. He has long owned the Army and Navy—though that may not be the impression he gets when he is conscripted—and now he owns the coalmines and railways, with the hospitals to follow.

The prevailing relation between the hospital and patient—founded on charity on one side and necessity on the other—has long been obsolete; and the time has come when it must be transformed, the hospital giving to the patient, by right, the deference which the best foundations have always given him by courtesy. Not long ago Dr. Ronald MacKeith [1] mentioned some examples of the sort of treatment which causes hospital patients distress; and the complaints he instanced are all of a reasonable kind. Patients think it unnecessary that they should be wakened and washed at 5.30 A.M. when they are not to breakfast until 7: and indeed many hospitals have already shown that in this the patients are right. They consider that they should not be left in uncertainty about the nature of their diseases, once they are diagnosed, and that they should be given adequate warning when an operation is necessary. They also think it alarming for a demonstrating chief to talk about such things as "tumours" and "cavities" to his class, when the patient under discussion has not been told what is wrong with him, or that grave manifestations of disease are patent to his doctors. Two less serious complaints were a dislike of being wakened in the night by the light of the nurse's torch, and a natural annoyance at being asked to make a second visit to hospital to provide a specimen of urine which could have been taken at the first visit. A famous matron used to say to her nurses: "Remember that the patients and their friends are your guests, and the guests of the hospital." If that spirit had prevailed everywhere complaints like those quoted would have been rare instead of common.

It has been suggested that hospitals might collect, over a year, the written complaints of patients on discharge. The hospital committee might find such a complaint-book made astonishing reading, bringing to their notice practices which they had no idea that the hospital was pursuing or they themselves fostering. How many senior physicians or surgeons train their houseman to sit down and discuss his case with the patient, or to find out his fears and reassure him? It is the exception rather than the rule for the patient to come out of hospital knowing clearly—albeit in everyday terms—what exactly has been wrong with him, and what exactly has been done to set it right; and sometimes his family doctor is so scantily informed by letter of what went on in hospital that he can make the position little clearer. It is a hardy patient who dares pin down the consultant, darting like a humming-bird from bed to bed, and pluck out the heart of his mystery: Scottish patients have been known to show the necessary firmness and persistence, but the diffident southerners hold their tongues and suffer. It seems incredible that responsible citizens should thus be treated like dolts, or that they should put up with it; but they do, and the old custom flourishes.

Mr. James Hunter's proposal [2] that patients' committees should take some responsibility over food, entertainment, general discipline, and complaints might usefully be applied in hospitals where patients must make a long stay: for the acute hospitals it might be better to have an ex-patients' committee to whom the patients of the day could send their complaints; and this might work in friendly touch with the hospital management committee. But why need all the onus for raising standards fall on the patients? Surely it is primarily a duty for the medical staff. Whoever owns the hospitals or sits on committees, the people who can get things done are the doctors; and they can do many things about which patients would be unable to make recommendations. They could see, for instance, that patients get basal anæsthesia while they are in their beds; they could ensure that analgesia in childbirth is really to be had by all mothers; they could make sure that food is well served, that daily visiting is allowed, that smoking is not unnecessarily prohibited, and that patients are wheeled to the water-closet in chairs instead of being obliged to use the bed-pan long after it has become unnecessary. To do these things they will have to examine and override many of their own prejudices as well as those of their medical and nursing colleagues. But those who dread the evils of bureaucracy should be ready to cut red tape wherever they find it.

HYALURONIDASE FOR HASTENING THE ABSORPTION OF INJECTED FLUIDS

HYALURONIDASE, the "spreading factor" of Duran Reynals [3] and McClean, [4] causes a rapid spreading of fluid injected intradermally, because the enzyme breaks down the tissue barriers formed by the mucopolysaccharide hyaluronic acid. Hechter and colleagues [5] have now shown that a preparation of hyaluronidase made from bovine testis is non-toxic to man and will greatly hasten the absorption of subcutaneous fluids. They found that 4 μg. of this enzyme preparation increased the rate of absorption of subcutaneous saline in a guineapig twelve times while the administration of 2 mg. quantities to man caused no changes in blood-count or blood-pressure, and the only local effect was a dull aching pain with slight erythema in 5 out of the 7 subjects tested. Although the preparation is antigenic to guineapigs no sensitisation could be demonstrated in human volunteers by scratch tests. In 3 children aged from twelve days to nine months the injection of 10–20 μg. of hyaluronidase at the site of infusion greatly facilitated the administration of 150–400 ml. quantities of glucose-saline. Larger amounts of enzyme up to 100 times this quantity did not increase the rate of absorption further. In one of the patients, suffering from severe meningitis, fluid

1. *Lancet*, Jan. 17, p. 120.

2. *Ibid*, Feb. 7, p. 226.
3. Duran Reynals, F. *J. exp. Med.* 1929, **50**, 327.
4. McClean, D. *J. Path. Bact.* 1930, **33**, 1045.
5. Hechter, O., Dopkeen, S. K., Yudell, M. H. *J. Pediat.* 1947, **30**, 645.

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administered subcutaneously in the ordinary way was not absorbed, and intravenous administration was found impossible owing to obesity and vascular collapse; after the injection of the enzyme 400 ml. of saline was absorbed from the subcutaneous tissues in an hour, thereby improving the peripheral circulation considerably.

The use of hyaluronidase may enable fluid to be given subcutaneously to collapsed patients, in whom intravenous infusion sometimes demands a good deal of skill, but more evidence of its usefulness in such cases is clearly required before it would be safe to discard the well-tried intravenous method. The same applies to the subcutaneous administration of plasma, which Hechter and colleagues suggest may be possible with hyaluronidase; it will be desirable to ensure that the plasma protein as well as the fluid is being absorbed. Antitoxic serum has sometimes to be given intravenously to collapsed patients, and subcutaneous injection with hyaluronidase might prove useful for this purpose; but it would first have to be shown that the antitoxin so injected reaches the blood-stream without serious loss on the way. The technique may also be valuable in aiding the absorption of drugs given subcutaneously. The material has not yet been freed from antigenic factors but this is probably not of great importance. The need is for clinical evidence of its field of usefulness.

NURSING

PUZZLED, like the rest of us, to define the proper task of a nurse, the Nuffield Provincial Hospitals Trust [1] press for a job analysis of the work of every section of the hospital team—medical, nursing, medical auxiliary, and domestic. The aim would be not merely to assess present duties but also to determine the *proper* functions of members of the team. They urge that regional nurse-training boards, as recommended by the Working Party, should be set up in each hospital region, to be responsible for the formation and inspection of nurse-training schools in the area and to encourage research in nursing problems. Experience in medical training has shown that the best training is given in an atmosphere of research.

This latest report lays great emphasis on student status—a more urgent need, it is suggested, than revision of the curriculum. The student nurse should not be paid by the hospital authorities but should "receive such financial assistance as she may require by way of educational grants, preferably payable by her training school." The regional nurse-training boards should not merely have power to coöpt members from universities and other university bodies, as the Working Party proposed: their constitution should rather provide for "substantial and active representation" of the university and other educational bodies in the region, particularly the institutes of education which have been established in response to the McNair report on the supply, recruitment, and training of teachers. The General Nursing Council should be reconstituted and reoriented as an educational body, its present disciplinary work being delegated to a statutory penal committee. For the curriculum itself a three-year course is favoured, with a uniform basic training for all branches including mental nursing, and a period of practice under approved supervision before the nurse is admitted to the State register, even provisionally.

The factors causing wastage of student nurses have continued to operate despite appeals to hospitals authorities to do better; but in the long run improvement can come only from those who have to do with nurses, and the Nuffield Trust plead for a sustained and determined effort to get them to realise their responsibility in the present desperate situation. The regional nurse-training boards, they think, should be charged with the duty of bringing about a change of heart and action in hospital authorities, and they point out, as we have often done, that the medical staffs of hospitals could probably do more than any other single group to produce improvements. Hospital discipline should be made to harmonise with present ideas; nurses' representative councils should be multiplied, and nurses should be given an effective voice in the administration of their hospitals; standards of feeding should be raised; part-time nurses should be employed as widely as possible, and existing staff used more rationally; and the health of nurses should be supervised with particular attention to undue fatigue.

1. Observations submitted to the Ministry of Health on the Ministry's Working Party's Report on the Recruitment and Training of Nurses. Obtainable from the Nuffield Provincial Hospitals Trust, 12, Mecklenburgh Square, London, W.C.1.

TECHNIQUES OF OBSTETRICAL ANALGESIA

THE demand for effective analgesia during labour is stimulating the search for the ideal technique which will provide effective relief of pain without endangering mother or child. Gas and air, popularised by Minnitt, gives complete freedom from pain in only a minority of cases, though the rest are relieved to varying extents. Stronger anæsthetics like chloroform take the patient nearer to the edge of anæsthesia, so that while more effective they inevitably introduce new hazards. Trichlorethylene is increasingly favoured at the moment and there have been favourable reports of the simple inhaler recently described in these columns. Continuous caudal analgesia demands hospital facilities and a degree of skill which must limit its use to a small proportion of confinements in the biggest centres. There is no doubt about its efficacy, but it raises the forceps-rate and introduces such hazards as broken needles, infection, and inadvertent spinal infection.[1] Snoeck and Pirson [2] claim that a block of the lumbar sympathetic nerves has given perfect analgesia in 88% of 215 cases. However, with 'Nupercaine' the duration of analgesia was only four hours—too short a time for the average labour—while considerable skill is required in placing the solution accurately. A promising development in this field is the administration of procaine intravenously,[3 4] which was first given a clinical trial during the war for dressing burns [5] and has proved innocuous in such diverse conditions as status asthmaticus, pulmonary embolus, and angina pectoris, while it has even been used in larger doses as a total anæsthetic for major surgery.[6] Though worthy of further trial in obstetrics, intravenous procaine is unlikely to supplant such homely methods as chloroform à la reine or gas and air, for there is the obvious difficulty of making the intravenous route suitable for domiciliary midwifery.

THE PATIENT WITH THE PAINT-BRUSH

Adrian Hill has shown how painting can be used as a form of autotherapy.[7] When he introduced patients in a sanatorium to the pleasure of expressing themselves in colour, the results made it clear that painting was something more than an agreeable way for sick people to pass the time. In our daily lives more immediate duties often provide a useful escape from the creative instinct, which is among the most exacting of slave-drivers. But put a man to bed for a long illness, and his armour of busy-ness is destroyed in a single blow; and then is his chance to develop a taste he never knew he had, and to build up a new interest which may last him for life. This is boon enough for the physically ill: for the mentally ill painting has other uses. The child in the guidance centre who slaps paint on paper gets rid

1. *Lancet*, 1943, **2**, 297.
2. Snoeck, J., Pirson, C. *Acta clin. belg.* 1947, **2**, 157.
3. Allen, F. M. *Amer. J. Surg.* 1945, **70**, 283.
4. Johnson, K., Gilbert, C. R. A. *Anesth. and Analges.* 1946, **25**, 133.
5. Gordon, R. A. *Canad. med. Ass. J.* 1943, **49**, 478.
6. Allen, F. M., Safford, F. K. jun. *Anesth. and Analges.* 1947, **26**, 133.
7. Art Versus Illness. London, 1946. See *Lancet*, 1946, ii, 439.

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of much undigested emotion in the process; and his paintings often illustrate his troubling fantasies. Without much talk, and without conscious understanding, he may release himself from his worst anxieties in this way. Something of the same kind probably happens to the mentally sick adult when he has the chance to express his feelings in paint; and an exhibition of paintings by patients, now on view at Foyle's Art Gallery, Charing Cross Road, lends colour—fine slabs of brilliant colour—to this idea.

The paintings are by patients at the mental treatment centre, Hill End Hospital, St. Albans, and other hospitals. The Hill End work has been done under the guidance of Mr. N. C. Colquhoun, but his hand has been light: "the painters," says the foreword to the catalogue, "have been encouraged to give free expression to their ideas and to develop their own style in an unhampered way, though suggestions have been made freely when difficulties seemed likely to put a stop to progress." The results are splendid: these pictures have the direct simplicity of children's paintings, coupled with a feeling for shape and pattern which comes later in life. There are no timid doubts about the use of colour: the room shines with vermilion and blue and saffron, as brilliant as poster-paints can make them.

Each number in the catalogue represents the work of a particular patient; and an interesting series is provided by those numbered 1. These tall pictures are full of aspiring lines, usually expressed in trees, or the vertical lines of architecture. The paintings move from slightly conventional designs to the much freer treatment of "Winter, 1947," with its dappled half-transparent whites and greens, "The Open Gate," in which the blue of a girl's dress is the focus for the whole surrounding pattern of towering poplars, and "Summer Shelter," where the same trees or their fellows are gathered above the scarlet roof of a bandstand. It is strange, perhaps, that such an exhilarating use of colour should run throughout the exhibition: only one picture—"Full Moon" (no. 19)—shows a depressed design in purple, black, and blue. Often the colours are chosen subtly as well as boldly—as in "Quiet Village" (no. 32) and "Parsonage Cottage" (no. 2c). Only one or two patients seem to have had the misfortune to learn sketching; their neat compositions are not really at home in this gallery.

The exhibition, which was opened on Feb. 11 by Lord Horder, will run until March 6. Dr. W. J. T. Kimber, medical director of Hill End, spoke of the benefit which patients get from the opportunity to "stand and stare"; and not only patients, it seems, for Lord Horder spoke of the refreshment he derives, between patients, from looking at the Turner drawings in his consulting-room—"filling up the wells before the next one."

HUMAN ANTHRAX FROM ELEPHANT TUSKS

ANTHRAX is primarily a disease of herbivorous animals and has been reported from nearly every country in the world, but it is most prevalent in India, Africa, the Middle East, and China. Cases in elephants have been reported in Europe, India, and Africa. Anthrax in man is contracted from infected animals or animal products, so elephant products would be expected to be a potential source of human infection.

An unusual case reported from the United States[1] arose in a man of 59 who had been making piano keys from elephant tusks which he cut with an electric saw lubricated with water. The only cleansing to which the tusks were subjected was swabbing the cores with a long-handled sponge soaked in water. The illness began with a small pimple on the face. Within three days the man became progressively ill with chills and fever and on the fourth day he became semi-comatose and was admitted to hospital. Blood smears revealed large gram-positive encapsulated rods occurring singly and in long chains; gram-positive rods were also found in a smear of œdematous material from the face lesion. Penicillin therapy was begun but the patient died five hours after admission to hospital. Necropsy confirmed that the cause of death was anthrax. Preliminary spot sampling of surface areas of whole tusks for the presence of anthrax bacilli was negative, and negative results were also obtained on examination of the cleaning sponge. It is remarkable how seldom anthrax bacilli are found on suspected material. In this case the bacilli were subsequently isolated from the tusks, and the method of obtaining the sample is worth recording. A double bucket was used, the sides and bottom of the inner bucket being perforated. Samples of tusk scraps which had been sawn by the man before his illness were placed in the inner bucket under tap water and brushed. The washings were drained and poured into sterile jugs. In the laboratory the samples were centrifuged and the sediment taken up in about 50 ml. of sterile water. After guineapig inoculation a pure culture of *B. anthracis* was isolated. Some of the guineapigs died early from gas-gangrene infection. An attempt to isolate *B. anthracis* by culture without animal inoculation was unsuccessful.

The case illustrates the importance of considering anthrax in the differential diagnosis of cutaneous lesions in workers who handle elephant tusks. It appears that there is no known method of sterilisation which does not alter the physical qualities of the ivory.

1. Seideman, R. M., Wheeler, K. M. *J. Amer. med. Ass.* 1947, **135**, 837.

GLYCOGEN STORAGE DISEASE

IT is over eighty years since Claude Bernard discovered glycogen and established the importance of the liver in its metabolism; but it was not until 1928 that the disease characterised by excessive storage of glycogen in the liver and elsewhere was first recognised by Snapper and van Creveld.[1] The condition is generally known after von Gierke,[2] who described the necropsy findings in the following year. It seems clear that people with the disease have a congenital and sometimes familial defect of the enzyme system in the liver which converts glycogen to dextrose and dextrose to glycogen.

The disorder shows itself at or soon after birth. Usually the child is brought to the doctor because of painless swelling of the abdomen due to gross enlargement of the liver; there is no enlargement of the spleen or lymph-glands, and the child's general condition is good though his growth and development may be retarded. The differential diagnosis is mainly from cirrhosis of the liver, new growth (e.g., secondary neuroblastoma), and congenital steatosis. The principal biochemical findings are a combination of hypoglycæmia and ketosis, absence of the normal rise in blood-sugar after injection of adrenaline, an abnormal blood-sugar curve after glucose, and sometimes a raised blood-glycogen. No other function of the liver is impaired. In one striking, though uncommon, clinical type the heart is greatly hypertrophied owing to an accumulation of glycogen. Apart from occasional enlargement of the kidneys, it is unusual for hypertrophy of any other organ to be recognised during life; but post mortem an increased glycogen content may be found in most tissues. Glycogen persists in the body longer than usual after death, and van Creveld[3] suggested that the disorder may be a continuation of the fœtal condition in which the liver contains large amounts of glycogen of similar stability: in his view the basal lesion is disordered pituitary function.

Mason and Anderson,[4] believing that the pathogenesis varies, recommend that the term "von Gierke's

1. Snapper, I., van Creveld, S. *Bull. Soc. méd. Hôp. Paris*, 1928, **52**, 1315.
2. von Gierke, E. *Beitr. path. Anat.* 1929, **82**, 497.
3. van Creveld, S. *Medicine, Baltimore*. 1939, **18**, 1.
4. Mason, H. H., Anderson, D. H. *Amer. J. Dis. Child.* 1941, **61**, 795.

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disease" should be confined to cases in which there is definite failure of glycogenolysis. Though provisionally classifying cases in five main groups they agree with van Creveld in assigning all to two main divisions, according to whether the deposit of glycogen is chiefly in the liver or in the muscles, including the heart muscle. They found that the affected liver, although it can make glycogen from other sources, such as lævulose and galactose, cannot make it from glucose; and it cannot change glycogen back into glucose. Moreover, the lack of response to adrenaline is not due to any abnormality in the liver glycogen itself since this was readily broken down by a mash made from normal livers. Crawford,[5] who has investigated 3 further cases, agrees with this hypothesis of a double fault. He refers to the recent change in opinion regarding the origin of the ketosis, which has been reviewed by Soskin and Levine.[6] Ketone bodies are now generally held to be normal products of the liver which can be utilised by the tissues. They are found in excess with rapid fat katabolism, when, owing to their amount, the tissues are unable to oxidise them; this is quite independent of the rate of carbohydrate metabolism. Normally hypoglycæmia and ketosis appear only with inadequate glycogen storage; but in glycogen disease these are found in association with abundant stores of glycogen in the liver. Instead of

$$\text{Glucose} \rightarrow \text{glycogen} \rightarrow \text{glucose}$$

we have

$$\text{Glucose} \rightarrow \text{fat} \begin{cases} \nearrow \text{ketones} \\ \searrow \text{glucose} \end{cases}$$

There is still no sign of more rational treatment. Injection of pituitary hormones has been considered, and van Creveld reports benefit from a high carbohydrate diet. In his 1939 review he mentioned several children who had remained well for about ten years, sometimes with reduction in the size of the liver, after this treatment.

LET HIM EAT CAKE

THE "won't eat" child is a recurrent headache for the doctor, both in general practice and in consultant pædiatrics. The ætiology and treatment have come in for a good deal of discussion, which has made it clear that there is no royal road to success. The problem presents itself in three main groups: (1) the ill child whose anorexia is either a symptom of the general disturbance or the outcome of some local condition such as otitis media, dental caries, or buccal ulcer; (2) the "normal" but injudiciously handled child; and (3) the child suffering from a serious emotional disturbance. Confining himself to the second group, Bakwin [7] gives advice which is likely to be more useful in prevention than as a remedy once the feeding difficulty has set in. An important ætiological factor, in his opinion, is that doctors recommend the introduction of solids too early. "Babies are ready to handle solid food at about 3 or 4 months of age. A good sign of readiness is the response to insertion of the tongue depressor into the mouth." If the baby accepts it, he is ready for solids. A useful tip, but—in England at least—is solid food before 3 months a common dietetic fault? Bakwin's other points are more familiar. Mother presses too much food on the child, insists too much on what is "good for him," and feeds him when he ought to be feeding himself. These errors are not always accepted as such by those who matter most. The district nurse and the health visitor still set their faces against kippers and chips and try to keep the young in the straight and narrow path of semolina. According to Bakwin, Marie Lloyd's precept is an important law of dietetics and cannot be applied too early. The conscientious young mother, harassed by diet sheets and ration-books, should gain reassurance from this view of the trouble; but it does not get to the root of the real feeding difficulty. The problem is that mother cannot (not *will* not) take advice. Her anxieties and conflicts centre on food and force her to create an anorexia in her child. Refusal of food by a toddler or older child commonly goes back to a difficulty in the earliest weeks of life. It is no use telling these mothers to let the child have a little of what he fancies. The whole relationship between mother and child is wrong and must if possible be put right. Advice such as Bakwin's, if it can be disseminated to the right quarters, has its usefulness, but the important thing is to distinguish between the cases in which it will be acceptable and those where it is a waste of time to offer it.

5. Crawford, T. *Quart. J. Med.* 1946, **39**, 285.
6. Soskin, S., Levine, R. *Amer. J. digest. Dis.* 1944, **11**, 305. Soskin, S. *Physiol. Rev.* 1941, **21**, 140.
7. Bakwin, H. *J. Pediat.* 1947, **31**, 584.

COMPULSORY B.C.G. IMMUNISATION

LAST December the Norwegian parliament passed a new law for the compulsory tuberculin testing and immunisation of certain groups of persons against tuberculosis. This radical measure encountered hardly any opposition, because in the past twenty years tens of thousands of people (in a nation numbering only 3 million) had had direct experience of B.C.G.; because the doctors, tuberculosis specialists in particular, were in favour of it; and because the Norwegian department for social affairs (corresponding in some respects to our Ministry of Health) had prepared a comprehensive memorandum as a guide to the legislators. This memorandum recalled that in March, 1946, the head of the Norwegian army medical service pointed out that about half the men called to the colours were tuberculin-negative, and that B.C.G. immunisation could not be satisfactorily achieved on a purely voluntary basis. In the following September a committee of experts reported that compulsory B.C.G. immunisation was desirable (1) for all persons in a tuberculous environment, (2) for doctors, nurses, hospital workers, and other groups with a high tuberculosis morbidity, (3) for men liable for military service, and (4) for youngsters at the school-leaving age, students and others. Soon afterwards the Norwegian Tuberculosis Doctors' Association unanimously passed a resolution in its favour.

In a commentary on the various paragraphs of the Bill now enacted the department for social affairs says that, though in the world at large the number of persons inoculated against tuberculosis now runs into millions, no case of tuberculosis has so far been traced to B.C.G. The Oslo public-health service has found that the positive tuberculin reaction achieved with B.C.G. immunisation is nearly always present five to six years later. On the west coast of Norway, where opposition to vaccination against smallpox is common, there is no such opposition to vaccination against tuberculosis. In several towns where B.C.G. vaccination has been provided for those of school-leaving age, the percentage voluntarily accepting the offer has ranged from 50 to 90. It is calculated that if no compulsion is used the immunisation of all who need it will take too long; but on the other hand compulsory immunisation must be confined at present to the groups requiring it most, for the people who can undertake it are not unlimited. Doctors not yet familiar with the technique and wishing to master it are advised to take a four-day course.

THE INDEX and title-page to Vol. II, 1947, which was completed with THE LANCET of Dec. 27, is now in preparation. A copy will be sent gratis to subscribers on receipt of a postcard addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

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THE FIRST WORLD HEALTH ASSEMBLY

FINAL SESSION OF THE INTERIM COMMISSION

AT their recent meeting at Geneva, the Interim Commission of the World Health Organisation heard with mixed feelings that the requisite 26 ratifications of the WHO constitution by members of the United Nations had been received and that the first World Health Assembly could now be convened. On the whole, relief at the ending of an over-long interim period outweighed regret at the coming disappearance of a group which, under the able leadership of its chairman, Dr. A. Stampar, had learned and accomplished a great deal, with the help of a secretariat welded by its executive secretary, Dr. Brock Chisholm, remarkably quickly into an efficient working body.

Given the necessary ratifications, the first business of the Interim Commission was to fix the time and place of the World Health Assembly. They decided on June 24 to July 31 at Geneva. This reversed a decision taken at their fourth session in September [1] to hold it in the Western Hemisphere, the more acute shortage of dollars and the small number of ratifications from the American continent being the deciding factors. An invitation from the British Government to hold the assembly in London received little support and was withdrawn. The U.S.A. and the U.S.S.R. have not yet completed ratification, though the representatives of both on the commission assured the chairman that their ratifications would be coming shortly.

An encouraging feature at the fifth session was the presence of strong delegations from both the U.S.S.R. and the Ukraine, headed by Dr. C. Vinogradov, who had come alone to the previous meeting, and Dr. N. Baran, both vice-ministers of health of their respective countries. They made useful contributions, including joining in the condemnation of the many countries who had exceeded the terms of the International Sanitary Conventions at the time of the Egyptian cholera outbreak.[2] On the other hand, after long hesitations, the Ukraine and Byelorussia have decided not to accept the fellowships previously requested by them but to ask for the funds allotted to them from the post-UNRRA programmes to be spent entirely on medical literature: evidently the policy of *timeo Danaos* has won.

Naturally the decision to hold the first World Health Assembly within less than five months meant that a large part of the meeting had to be occupied in the preparatory work for it, including the preparation of the agenda, draft financial and staff regulations, and studies on headquarters and regional organisations, since these are statutory obligations on the Interim Commission: in consequence, technical matters were largely crowded out. The most interesting debate arose almost casually on the draft programme and budget for 1949 to be presented to the assembly, since it revealed a divergence of views on the basic philosophy of international health work. The American delegation wanted all the money available after providing for the statutory duties of WHO and its administration to be spent in an all-out attack on the major scourges of the world—tuberculosis, malaria, venereal diseases, and child mortality. Others felt that, while this might be an excellent talking-point for an appeal to Congress, the question was not quite so simple. Experience had shown that international action in the field of health involved a special approach and specialised techniques and not merely the subsidising and reinforcing of national action. As the British delegate, Dr. Melville Mackenzie, pointed out, it was not a question of deciding which were the most important diseases affecting mankind and then attacking them, but of deciding what diseases and problems could best be dealt with by international as opposed to national action, and by what methods. Rabies and leprosy had been included in the programmes of the Health Organisation of the League of Nations, for example: but experience had shown that international action against them was limited and largely ineffective. Against this, it was pointed out that governments would make demands for all kinds of action in a large number of the most diverse problems: satisfaction could not be given to all and might therefore be given only to those exerting the most pressure; the result would be a "spotty," incomprehensible, and indefensible programme which would satisfy nobody. Eventually a compromise was reached, and probably the truth lies somewhere between these two extremes. Since perhaps in no field of medicine can large sums be more easily wasted or small sums produce more striking results than in international work, it would be well if governments gave some thought to this basic question in advance of the assembly.

1. *Lancet*, 1947, ii, 474.
2. *Ibid*, p. 797.

BRITISH FACTORIES IN 1946

PERHAPS prompted partly by the continuing competition for labour, factory managements are striving as never before to improve the working conditions of their employees. This emerges from the report [1] for 1946 of the chief inspector, now Mr. G. P. Barnett. The need for attention to these conditions was emphasised during the year in the reports of working parties which investigated six industries. At the same time, however, in some areas slum property or unsuitable premises were being increasingly used. Perhaps unfortunately, it is only where there is risk of bodily injury that inspectors can apply to a court of summary jurisdiction for an order to prohibit the use of premises as factories.

During the year the number of accidents reported under the Factories Act, 1937, was 223,759. Of these, 826 were fatal and 222,933 were non-fatal—respectively 3% and 7% less than in 1945.

By the end of the year the normal working week had been reduced in many industries to 45 hours or less. The five-day working week introduced in these industries, says the report, proved very popular with married women, and reduction in absenteeism and lateness was observed; but the report offers no firm evidence about the effect on output.

1. Annual Report of the Chief Inspector of Factories for the Year 1946. Cmd. 7299. H.M. Stationery Office. Pp. 132. 2s. 6d.

THE PLEBISCITE

LAST Saturday was the closing date for British replies in the British Medical Association's plebiscite on the National Health Service Act. By courtesy of the *British Medical Journal* we publish the accompanying summary and analysis of answers received up to second post on Monday. The questionary was addressed to all registered medical practitioners in Great Britain or serving in H.M. Forces at home or overseas; and of those in civilian categories 84% have replied. The questionary was also sent to 1233 doctors with foreign qualifications who are resident in Great Britain and whose names are on the Temporary Register.

Of the practitioners who answered, 10% approved and 90% disapproved of the Act in its present form. The first four groups in the classification given in column (2) on the opposite page replied as follows:

Group	Section A		Section B		Section C	
	Approve (%)	Disapprove (%)	In favour (%)	Not in favour (%)	Do not agree (%)	Agree (%)
1a	6	94	9	91	11	89
1b	24	76	34	66	39	61
2	8	92	12	88	14	86
3	12	88	16	84	18	82
4	12	88	16	84	19	81

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TABLE I

(1) Reference to Plebiscite Form	(2) Classification of professional work	(3) Registered medical practitioners either resident in Great Britain or serving in H.M. Forces at home or overseas (55,842 plebiscite forms issued)						(4) Medical practitioners with foreign qualifications resident in Great Britain who are for the time being registered by the General Medical Council (1233 plebiscite forms issued)	
		England and Wales		Scotland		Total Great Britain			
A		Approve	Dis-approve	Approve	Dis-approve	Approve	Dis-approve	Approve	Dis-approve
	1a. Consultant or specialist, not holding whole-time salaried post	228	3655	41	432	269	4087	4	12
	1b. Consultant or specialist, holding whole-time salaried post	339	1132	73	176	412	1308	3	4
"I APPROVE of the National Health Service Act, 1946, in its present form."	2. General practitioner, principal ..	1207	13,614	206	1689	1413	15,303	4	5
	3. General practitioner, assistant ..	251	1958	55	365	306	2323	25	57
	4. Whole-time voluntary hospital ..	393	2928	74	497	467	3425	7	5
	5. Whole-time local authority general hospital	200	1052	17	119	217	1171	4	4
	6. Whole-time local authority special hospital	147	657	27	156	174	813	13	11
"I DISAPPROVE of the National Health Service Act, 1946, in its present form."	7. Whole-time public health service ..	277	1683	39	245	316	1928	9	5
	8. Whole-time Government service ..	101	519	26	115	127	634	2	3
	9. Whole-time teacher	95	313	15	111	110	424	1	2
	10. Whole-time research	92	182	12	38	104	220	2	7
	11. Other whole-time non-Government post	46	354	7	59	53	413	0	3
	12. Medically qualified dental surgeon ..	9	246	3	61	12	307	3	4
	13. Retired	148	3355	28	524	176	3879	1	0
	14. Unclassified	266	1946	57	353	323	2299	15	16
	15. Services, permanent commission ..	..	..	..	..	47	779	1	1
	16. Services, temporary commission, specialist	..	..	..	..	31	169	5	3
	17. Services, temporary commission, graded specialist	..	..	..	..	41	268	1	1
	18. Services, temporary commission, general duty officer	..	..	..	..	137	1064	17	5
	Totals	3799	33,594	680	4940	**4735**	**40,814**	117	148

TABLE II

B		In Favour	Not in Favour	In Favour	Not in Favour	In Favour	Not in Favour	In Favour	Not in Favour
"I AM IN FAVOUR of accepting service under the Act in its present form."	1a. Consultant or specialist, not holding whole-time salaried post	340	3571	66	404	406	3975	6	11
	1b. Consultant or specialist, holding whole-time salaried post	473	946	92	148	565	1094	3	3
"I AM NOT IN FAVOUR of accepting service under the Act in its present form."	2. General practitioner, principal ..	1784	13,204	301	1610	2085	14,814	2	4
	3. General practitioner, assistant ..	344	1870	71	353	415	2223	26	49
	4. Whole-time voluntary hospital ..	522	2767	91	467	613	3234	7	5
	Totals	3463	22,358	621	2982	**4084**	**25,340**	44	72

TABLE III

C		Do Not Agree	Agree	Do Not Agree	Agree	Do Not Agree	Agree	Do Not Agree	Agree
"I AGREE to abide by the decision of the majority and undertake not to enter the service if the answers to part B reveal a majority against undertaking service as defined in para. 4 of preamble and if so advised by the British Medical Association."	1a. Consultant or specialist, not holding whole-time salaried post	406	3406	67	387	473	3793	3	12
	1b. Consultant or specialist, holding whole-time salaried post	518	808	97	137	615	945	1	5
	2. General practitioner, principal ..	1887	12,671	351	1506	2238	14,177	1	7
	3. General practitioner, assistant ..	369	1778	83	326	452	2104	12	59
"I DO NOT AGREE to abide by the decision of the majority if it is against accepting service as defined in para. 4 of preamble."	4. Whole-time voluntary hospital ..	600	2611	116	436	716	3047	5	7
	Totals	3780	21,274	714	2792	**4494**	**24,066**	22	90

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In England Now

A Running Commentary by Peripatetic Correspondents

I WISH statisticians were not such superior types. Shades of Pearson! I wish they would leave their nice cosy little studies and come into the cold cruel laboratory world. Sour grapes, eh? I'm afraid so! Well, dash it, the blighters aren't human! Only a statistician could have said such hard things about the protocols of one of my recent experiments. It is useless to tell these cod-eyed unsympathetic gentlemen that gap 1 in the data was due to some coot squashing a precious experimental animal beneath a cage lid; that gap 2 resulted from a blown fuse in the rat-house, when the consequent drop in temperature accounted for yet another animal; that gap 3 arose from some buffoon mixing up a couple of cage labels so that a couple of controls were maltreated; that gap 4 coincided with the onset of good golfing weather—but what's the good? I appreciate the brilliant contributions of the statisticians to modern biology, but I must confess to a sneaking sympathy with the old clinician whose criteria of significance of experimental data were stern but simple. "If it hits you between the eyes, laddie," he'd say, "it's significant. If it doesn't, it isn't."

* * *

Diabetics must be either masochists or heroes—at least, so I think since I tried to inject myself. Last month I had a stye (hordeolum to some). I had heard of the new drug penicillin, so bought me a mega-unit—and very expensive it was too. A syringe was boiled in the egg saucepan and I was ready to deliver the first dose.

Now, in illustrated advertisements for a brand of insulin I have seen a lady in her negligée nonchalantly inserting a needle into the front of her thigh. I pinched up a morsel of skin—after cleansing it, of course—but this was painful. Next I stretched the skin tight, and keeping the needle nearly horizontal to the surface I slowly but surely slid it through the epidermis. This was pretty agonising but it was nothing to what I felt when I pressed the plunger. Penicillin is anything but painless, take it from me. I leapt to the mirror but the stye (pardon—hordeolum) was still there.

The next twelve hours were overshadowed by the thought of the remaining half-million units. After all I couldn't waste them. All attempts to enlist the assistance of my wife failed, so I had to administer the final shot myself. This time I thought that the intramuscular gluteal approach should be tried. Trousers down, buttock cleansed, I stood before the mirror with needle poised. Right toe in, weight on the other foot—that relaxes the glutei, you know—eyes shut and "Ouch!" My goodness; there was the needle embedded up to its hilt and all I had to do was to fit the syringe into the needle. Easy? Well; you try it in this posture. In the end I just stood like a darts board with the triumphant "double top" until my wife came to the rescue. She was so convulsed with laughter that at least 250,000 units went down my leg.

However, my hordeolum did very well on hot boric spooning thank you.

* * *

Lance is now a respected senior honorary, and only an occasional twinkle in his eye betrays his other and more turbulent self. Tales of his adventures as house-physician were freely told in hospital and probably lost nothing in the telling. In those days Lance rarely saw eye to eye with the lay committee and was often reprimanded by that body. He was not one to brood over injustice, but he must have given considerable thought to his method of retaliation. The story goes that he and a porter, who also had no cause to love the committee, took down at dead of night from the main hall the marble bust of the eminent gentleman who founded the hospital. Working through the small hours they made a very presentable plaster cast of the bust, which, when varnished and dirtied and mounted on the hall pedestal, looked authentic enough; it would not have stood close scrutiny but no-one was likely to give it a second glance.

Next morning the lay committee were assembling in the hall before their meeting when Lance, in hat and overcoat, came down the main corridor. In his hand he was swinging a heavy cane—quite a usual appurtenance for a well-dressed young man in those days. He had no business to be going out at that time of day and the committeemen viewed him with considerable disfavour. As he passed he smiled cheerfully and stepped to one side as if to avoid the throng. His swinging cane increased its orbit and—horror of horrors!—swept off the Founder's plaster head.

The committeemen were loud in their indignation and thought it a good opportunity to rid themselves of Lance once and for all. He was asked to accompany them to the committee-room, where he made them still more apoplectic by denying that he had done anything wrong. After a suitable interval he challenged them to prove his fault. Thinking him well-nigh insane they swept him out into the hall, where his friend the porter had removed the debris and replaced the original marble bust. It was Lance's day.

We never heard the sequel to this wildly improbable incident and no doubt it was an anticlimax. Perhaps the whole story is apocryphal, but we who were Lance's clerks found it credible enough.

* * *

Belief in magic dies hard, even in these disillusioned times. Take the case of an elderly relative of mine, brisk, business-like, and religious, who returned from a holiday in September with severe urticaria. Her doctor started treatment, and progress was reported to me week by week by letter, while I dispensed sympathy, for the attack was obstinate. The only things that gave even temporary relief were antacids or mild purgatives such as Gregory's powder. I suggested, although it was not for me to interfere, that she might try leaving out various items in her diet in turn, for I suspected the tomatoes she said she was eating liberally. Vaughan puts tomatoes high on the list of substances causing allergy. My suggestion was not, I think, followed. Time went on and the victim's brother, also a doctor, went home for a holiday and collaborated with the local man. They tried most of the known remedies without success—most of them, the patient declared, upset her. Anti-histamine drugs she particularly disliked, much to her brother's indignation, who declared it was imagination. By mid-December the trio were in despair, and the patient, who lives in the wilds of Gloucestershire, meekly asked if she might try an old country remedy—stinging nettles. Delighted at the opportunity of studying sympathetic magic in action, I wrote and asked how the nettles were to be used—was the patient to flagellate herself with them, or was she to wear them as a vest, like a swan in a fairy tale? There was a dignified silence, and then the patient, cured, sent me a postcard which read:

"URTICARIA.—Gather young tops of stinging nettles. Boil like cabbage (no salt), have a good helping with ordinary dinner, and drink the liquid; or to save time just pour boiling water over, cover, and drink when infused. But it is better to eat them as a vegetable."

Some will firmly utter the blessed word "coincidence," while others will murmur "auto-suggestion." The more up to date will say "vitamins," and readers of your annotations may even mutter "histamine and acetylcholine." But to the sufferer a cure by any name is sweet.

* * *

Dust in foundries is one of my preoccupations, and the other evening while ruminating on the problem of sand I overheard my daughter reading aloud *The Walrus and the Carpenter*, with obvious delight in the words and rhythm. I was startled into full consciousness when she came to: "They wept like anything to see such quantities of sand." The mixture of the Walrus's tentative optimism and the Carpenter's downright defeatism exactly fitted my frame of mind—if seven maids could do anything about the sand it *would* be grand!

* * *

The late Professor X loved to tell of the days when he worked with Pavlov. A colleague was once heard to observe cattily that Professor X's function in Pavlov's laboratory had doubtless been to ring the bell.

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Letters to the Editor

"RENAL ANOXIA"

SIR,—It is interesting to see how "renal anoxia," a functional concept advanced by Tomb in 1942 to account for the pathogenesis of crush-syndrome anuria, has been taken up by various writers and groups of writers to account negatively for almost as many kidney ills as "toxæmia" used to account for, positively, in a previous age. Thus Professor Hower and Dr. Woolmer (Dec. 30 and Jan. 17), and their critic, Dr. Mallinson (Jan. 3), subscribe to "renal anoxia" as an "undoubted cause of death," however much they may disagree as to whether intravascular hæmolysis due to 'Myanesin' caused it. Further, these authors and others believe that there is a pathological picture characteristic of "renal anoxia," following in the all-embracing footsteps (if I may perpetrate a bull) of Havard and Maegraith. Quite apart from the objection that the functional concept would be better described as renal ischæmia (since it has never been proved that lack of oxygen alone is the limiting factor), it is well to remember that there is a pathological picture characteristic of renal ischæmia—that is, cortical necrosis. Despite this traumatic age, there seem to be recorded only 2 cases of this condition due to trauma (Furtwangler and McFarlane) as against about 20–30 in other conditions excluding pregnancy or in apparently healthy men.

According to my own observations in man, degrees of renal ischæmia short of necrosis produce a patchy degeneration of *proximal* convoluted tubules such as may be seen also in the photomicrographs of Scarff and Keele illustrating the results of renal-pedicle occlusion in the rabbit. These workers reported that their experimental ischæmic lesions resembled those of crush syndrome; but of 54 autopsied cases of that syndrome that I have examined histologically, only 1 showed proximal tubule damage (a small infarct). In both crush syndrome (myohæmoglobinuric nephrosis) and mismatched-transfusion kidney, the lesions affect the distal convoluted tubule entirely and are attributable, in my view, to pigment precipitation thereon; this produces failure of absorption of filtrate (half the weight of the kidney in ml. every minute) in the distal tubule, with rapid rise in intrarenal pressure and distension of parts proximal. Finally, rupture of the tubule occurs just proximal to the beginning of the distal tubule, and glomerular filtrate pours into the interstitial substance, lymph pathways, and veins.

This is the characteristic picture of pigment nephrosis and it is quite unlike cortical necrosis. An identical picture except for the absence of pigment is seen in sulphonamide-crystal blockage, in mersalyl poisoning, and in acute hydronephrosis, as I described in 1945. The implications of this seem yet to be unrecognised, perhaps because of the current mass-yearning to induce, implicate, and inhibit reflex vasospasm.

It may well be that, after a rise in intrarenal pressure produced by blockage of ureters or inhibition of reabsorption by pigment or other substances, the effective blood-flow decreases: that some blood-shunting through the less swollen medulla or shunting of glomerular filtrate through ruptured tubules into veins may take place, thus decreasing the extraction ratio of P.A.H., &c. But in that case there is no need to postulate renal vascular spasm (unilateral or no!) as a primary mechanism. In true anoxia, the human brain seems to be the first organ affected and then the liver: in dogs, the liver seems most vulnerable to ischæmia, leading to irreversible circulatory failure. Renal damage is not a feature, unless hæmolysis or myolysis is associated.

In fact, as in Professor Hewer and Dr. Woolmer's patient, there is seldom severe circulatory failure in the cases described as "renal anoxia": many other patients suffer a much longer and more severe circulatory depression without developing renal lesions. As has been recognised by Lucke, Mallory, and others, most cases of traumatic anuria are, in fact, examples of pigment nephrosis (32 out of a total of 360 fatal casualties). This may be due to myolysis (as has been recorded after injury, electric current, beating-up, or from the weight of the unconscious body) or to hæmolysis.

What is needed is more careful clinical examination for pigments of urines at an early stage; more careful pathological examination for necrotic muscle in the buttocks and near-fracture sites, such as Barlow, Stead, and I have found (unpublished data); further studies of renal hæmodynamics in human cases of hydronephrosis and "post-traumatic anuria"; and, until carefully substantiated, less use of "shock," "renal anoxia," and other such catchwords.

Postgraduate Medical School of London. E. G. L. BYWATERS.

VITAMIN E IN ANGINA PECTORIS

SIR,—In your issue of Jan. 17 there are two reports regarding the lack of effectiveness of alpha-tocopherol (vitamin E) in "angina pectoris."

In the paper by Dr. Makinson and his colleagues, no attempt was made to give any diagnoses or physical findings in the patients involved. We feel that this omission makes it difficult to evaluate their experience properly. For example, the American Heart Association does not recognise "angina pectoris" as a diagnosis; it is a symptom which may be present with any type of heart disease. In our paper on the anginal syndrome,[1] 84 patients were described. All but 6 had some objective signs of cardiac disease; and of these 78 the majority were decompensated. A patient with frank signs of heart disease is far more likely to give a true and objective report than one who has "angina pectoris."

Makinson and his co-workers say that "no patient who had clinical or electrocardiographic evidence of coronary thrombosis in the previous six months was included." Why? Pain with coronary thrombosis should be a more clearly demarcated entity than the one selected.

Pain is only one manifestation of heart disease and can readily be simulated. But we doubt that dogs and cats are amenable to suggestion or that placebos can restore such animals to full vigour. Lambert[2] gave alpha-tocopherol to 50 cardiac dogs and cats, helped all, and sent some of the dogs in severe failure back into the hunting-field. In order to meet the argument of sceptics who dwell on "pain" only, we have stressed the value of alpha-tocopherol in decompensated cases or those with proven coronary thrombosis. An article of ours which appeared a few weeks ago[3] illustrates with the aid of coloured photographs what vitamin E can do for peripheral vascular disease, and should be consulted by any student of this vital problem. It is hard to argue that what alpha-tocopherol alone has done for these cases of impaired peripheral circulation it cannot also do for ischæmic heart muscle.

In our paper we reported using 200–400 mg. alpha-tocopherol per diem: Makinson used 150 mg. per diem. We regard 150 mg. as an inadequate dose: we are not treating a deficiency but using the vitamin as a drug.

In a report just submitted for publication we have reviewed, after one year, the status of the patients studied in the earlier papers by Dr. Skelton and us.[1 4] These cases had all received adequate doses of alpha-tocopherol for periods varying from 13 to 18 months. It will be seen from the tables in that note that each series showed more cases with either marked improvement or complete relief of signs and symptoms, after one year, than at the time first published, when the average length of treatment had been only 7 weeks. Makinson and his associates gave a small dose for 3 weeks; and we would have had no better results in such a length of time with such a dose. When the original article specified 200–400 mg. per diem, why use 150 mg.? This dose has proved to be the minimum for treating not only cardiac disease but also peripheral vascular disease[5]; only occasionally have beneficial results been seen after doses of around 100 mg. per diem.[5] This matter of dosage is crucial.

1. Shute, W. E., Shute, E. V., Vogelsang, A. *Med. Rec., N.Y.* 1947, **160**, 91.
2. Lambert, N. H. *Vet. Rec.* July 19, 1947.
3. Shute, E. V., Vogelsang, A., Skelton, F., Shute, W. E. *Surg. Gynec. Obstet.* 1948, **86**, 1.
4. Vogelsang, A., Shute, E. V., Shute, W. E. *Med. Rec., N.Y.* 1947, **160**, 279.
5. Molotchick, M. B. *Ibid*, no. 11.

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From Dr. Ball's letter, also in your issue of Jan. 17, it will be noted that of 10 patients, 5 were hypertensives in whom the blood-pressure was not significantly changed by tocopherol therapy. Of these 5, only 1 showed any improvement. Of the remaining 5, 3 showed some improvement. These figures, although based on a very small series, are comparable to our own. On reclassifying our 35 hypertensive cardiacs with anginal pain into those whose blood-pressure fell to normal limits on tocopherol therapy (17 cases) and those whose blood-pressure remained abnormal (18 cases), we found that in the former group there was marked improvement or complete relief from pain in 16 cases (94%), whereas in the latter group there was worth-while improvement in only 6 cases (33%).

Our experience in the last two years now covers more than 3000 cardiac patients personally treated. As a matter of fact, we have treated more physicians than the number of patients reported in these two series. We have felt no need to retract any of our original contentions—in fact they are rapidly being extended.

One has only to consult the work of Govier [6] to understand the sound biochemical background for our clinical results. He shows [7] that both digitalis and alpha-tocopherol aid impaired cardiac-muscle metabolism and that a synergism exists between the actions of the two preparations. Other pertinent work is that of Martin and Faust [8] and Holman.[9]

Finally, it is to be hoped that in the future investigators will be more careful to duplicate our methods, with especial regard to dosage and duration of treatment.

W. E. SHUTE
E. V. SHUTE
A. B. VOGELSANG.

London, Ontario.

ARTIFICIAL PNEUMOTHORAX

SIR,—In their article of Jan. 31, Dr. Maclean and Dr. Gemmill make a valuable contribution to the treatment of tuberculosis during this difficult time when the usual waiting period for a sanatorium vacancy has become stretched from days to months. They say that they expect criticism, and in fact domiciliary collapse therapy has been condemned by other writers in the last few months.

I should like to give a short account of my own experience with domiciliary collapse therapy and at the same time to congratulate the Glasgow workers on their encouraging results.

It may be remembered that in 1942 Dr. Toussaint and I started a chest X-ray service for patients with minor symptoms of respiratory disease, and this service has now become known as the "Bermondsey and Southwark scheme." Through it we were finding a fairly large proportion of early cases of pulmonary tuberculosis, but during the long wait for a sanatorium vacancy some patients were showing signs of deterioration. We were thus unable to live up to our slogan: "Early diagnosis, early treatment." Accordingly in May, 1946, we decided, with some misgivings, to attempt a programme of collapse therapy in patients' homes in our respective boroughs. (Dr. Toussaint has since transferred to Middlesex county council, but I understand that he is still carrying out the same policy with some modifications.)

Since May, 1946, I have started home treatment on nearly 100 cases, but owing to the relatively short time that this work has been carried on my figures are neither so impressive nor so complete as those from Glasgow. I have, however, come to the conclusion that home collapse therapy is not only practicable but that it has a definite place in the treatment of pulmonary tuberculosis. Already I have been able to cancel sanatorium vacancies in 19 cases, and all have returned to work. (In the case of married women resumption of normal domestic duties has been classified as "return to work.") In 2 cases an artificial pneumothorax, previously abandoned at other dispensaries, was successfully reinduced at this dispensary because there was radiological evidence of reopening of a cavity without grave constitutional symptoms. Both these patients lost only a few days from work. Of the remaining cases, 24 have had, or are still having, sanatorium treatment, and 9 of these have returned to work. A further 9, all advanced when domiciliary treatment was started, have died. The remaining cases are still receiving treatment.

Owing to the impossibility of obtaining hospital beds even for a short period, the routine of collapse therapy in Southwark differs considerably from that practised in Glasgow. The induction and the first three or four refills are always carried out in the patients' homes. Two or three weeks after the induction, the patients are brought by ambulance to the chest clinic for X-ray examination and refill, and thereafter weekly until they are well enough to attend on foot or by public transport.

I notice that most of the Glasgow cases had unilateral lesions. In Southwark I have attempted to treat at home almost any case which could be expected to benefit from collapse therapy. I have also included cases which have broken down after they had been treated at a sanatorium. As a result my cases have fallen roughly into two groups: (1) moderately early and with fair prognosis, and (2) advanced and with bad prognosis. The first group have been treated mainly by artificial pneumothorax, but no case has been induced without at least three weeks' bed rest at home during which time temperature charts have been kept. No case has been induced while still pyrexial. Most of the second group have been treated by pneumoperitoneum, reinforced before or after the induction by a phrenic crush which the local L.C.C. hospitals have been good enough to arrange.

As a result of my observations on these domiciliary collapse-therapy cases, I have come to the conclusion that the pneumoperitoneum has great value in assisting the "cooling-off" of active lesions. After the pneumoperitoneum has been maintained for a few months, I have been able to induce a pneumothorax in several cases on which I would not have dared to undertake it when the patient was first seen.

Lastly, I would like again to emphasise the value of bed rest in the early stages of treatment before collapse therapy is begun, and the psychological value of promising a patient some form of active treatment if he coöperates in obeying instructions with regard to bed rest. All home treatment depends to a large extent on the tact and persuasive powers of the health visitors who have to supervise the domiciliary conditions before and after collapse therapy is begun. In this I have been particularly fortunate.

E. K. PRITCHARD

London, S.E.17. Tuberculosis Officer, Borough of Southwark.

NATIONAL HEARING-AID

SIR,—According to the Medical Research Council's committee on electro-acoustics,[1] prototypes of the national hearing-aid now being manufactured were tested by 27 deafened persons; and Lord Walkden tells us in the House of Lords that these tests were each of three hours' duration. The following facts should be taken into account when considering the results of the Medical Research Council's tests:

1. Post-war models of British commercial hearing-aids were not included in the tests by the Medical Research Council's committee.

2. Most reputable British hearing-aid manufacturers are prepared to allow any of the deafened public a full week's unrestricted trial of their products, under ordinary conditions of use, before purchase need be considered; and during the trial the instrument can be compared with any other British or American aid.

3. Production models of post-war British commercial hearing-aids will, without doubt, compare favourably in efficiency, compactness, and appearance with production models of the national aid when available.

4. The deafened public are not likely to remain satisfied for long with the Government free aid which has been made obsolete by British commercial hearing-aid manufacturers' latest models.

H. C. GEE

Secretary, Hearing Aid Manufacturers Association and Society of Aural Technicians.

London, W.C.1.

6. Govier, W. M., Yanz, N., Grelis, M. E. *J. Pharmacol.* 1946, 88, 373.
7. Govier, W. M. (personal communication).
8. Martin, G. V., Faust, F. B. *J. exp. Med.* 1947, 5, 405.
9. Holman, R. *Fed. Proc.* 1947, 6, part 1.

1. Hearing Aids and Audiometers. *Spec. Rep. Ser. med. Res. Coun., Lond.* no. 261. H.M. Stationery Office. 1947.

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PLANTAR WARTS

SIR,—Mr. McLaughlin's warning (Jan. 31) against the use of X rays or radium in the treatment of plantar warts will be endorsed by all who have seen or experienced the painful, intractable ulceration that may result from this treatment.

The common use of radiotherapy probably arose from its ease of application and convenience to the patient, for there are at least two other methods of treatment equally or more effective, and the following may be found a useful routine.

At the first interview the time factor is discussed with the patient or parent, and if there is a desire for radical treatment without delay, or if coöperation by other means seems unlikely, curettage and cautery is performed.

If the patient is agreeable to slower results and is capable of coöperation in the use of formalin soaks, this method should be given a trial, since many cases so treated will not have to go on to curettage. Exact instructions should be given, preferably printed, with emphasis on preliminary maceration by immersion in warm water for ten minutes, followed by protection of the surrounding skin with soft paraffin and ten minutes' puddling in 5% formalin. At weekly intervals the patient attends for painless removal with fine-pointed nail scissors of as much of the wart as possible.

Curettage and electric cauterisation is seldom followed by relapses, provided attention is given to complete removal by scissors of the "collar" left after curettage, and to curettage of all friable material in the base of the wart and in any burrowing marginal extensions.

Probably greater security from recurrences may be obtained by the use of phenol liquefactum as a cauterising agent, followed by electric cauterisation of any bleeding points; but diathermy is not without risk of the production of painful scarring from unintentional "cooking" more deeply than is desired. Some patients find it necessary to rest for two or three days after this treatment, but others find the immediate postoperative discomfort no worse than that of the wart before operation.

A difficulty, particularly in children, is the problem of anæsthesia, for the injection of procaine around a lesion in the centre of the sole can be intensely painful. It is preferable to treat the patient prone, as this gives better access and control and the plantar tissues are more relaxed. Moreover, the patient is not looking at the operator and attention can more easily be distracted from the foot—for example, by enforced deep breathing. A fine needle should be used and the injection given very slowly. General anæsthesia may be preferred for very extensive or multiple lesions.

London, W.1. BRIAN RUSSELL.

SIR,—Mr. McLaughlin's article has caused some interest among chiropodists, who acquire a wealth of clinical experience in the treatment of plantar warts.

The plantar wart causes disability ranging from trivial to crippling; and the condition is far more widespread than is generally appreciated. Of the thousands of cases treated by chiropodists each year, only a few have to be referred for more energetic measures. The remainder are cured without scarring and without being laid up, even for a day. Surely the statement that "It is high time that the many victims of this condition were spared endless visits to a chiropodist" is made without due consideration of all factors. The chiropodist does not wish to claim proprietary rights in the treatment of plantar warts and is quite prepared to refer all cases to the surgeon if he produces the cures with as little discomfort and without the necessity of indicating even "light duties." Most cases are cleared up in 3 or 4 visits, while others are cured by occasional visits supplemented by home treatment. It is easy, of course, to focus attention on the rare resistant case which obviously is more suitable for surgical treatment; and it is no simple matter to prophesy which will respond to conservative measures and which will not. The use of local anæsthesia, curettage, and diathermy is, in our view, usually unnecessary and may sometimes be impracticable—for example, in a large outbreak at a school.

The chiropodist, as a registered medical auxiliary, is fully aware of the scope and limitations of his field, but he is confident of his ability to benefit this condition. When cases occur which obviously demand treatment outside his sphere, he is very ready to take advantage of higher knowledge and skill by referring such patients; and this is the normal procedure. But it is quite another thing to sweep aside a very effective conservative technique and to claim that the treatment outlined in the article is the rational one and should always be the method of choice.

London, W.1. JOHN H. HANBY
President, Society of Chiropodists.

PHOSPHATASE AND BONE FORMATION

SIR,—I was very interested in the article on this subject by Dr. Slessor and Dr. Wyburn in your issue of Feb. 7. On this question of ectopic bone formation, it has seemed to me that insufficient attention has been paid to the work of C. B. Huggins at the University of Chicago which was published about 1930. In those days I was in America and had the privilege of repeating some of Dr. Huggins's experiments, the results of which have always fascinated me. In dogs, epithelium from the bladder when transplanted into connective tissue (for example, the rectus abdominis muscle) formed a cyst around which new bone formed. When, however, the epithelium was transplanted into a solid viscus like the liver or spleen, bone formation did not take place. Most remarkable was the transformation which one could follow in the surrounding primitive connective-tissue cells and their differentiation into osteoblasts. Intestinal epithelium if transplanted did not provoke a similar reaction. Dr. Huggins was led, I think, to believe that it was the secretion of phosphatase by the transplanted urinary epithelium which stimulated the surrounding biological transformation.

I cannot now speak with any authority upon this problem, but I do remember that similar experiments carried out with rabbits did not produce the same results. The work of Huggins does—at any rate to me—seem to lend support to the view of Slessor and Wyburn that the formation of bone involves more than the hydrolysis of phosphoric esters by phosphatase, and that this something is the activity of the differentiated connective-tissue cells (osteoblasts).

Princess Elizabeth Orthopædic Hospital, Exeter. NORMAN CAPENER.

PHARMACY OF SODIUM p-AMINOSALICYLATE

SIR,—Having been responsible for making a detailed study of the chemistry, bacteriology, and pharmacology, and directly associated with the clinical evaluation of p-aminosalicylic acid (P.A.S.), and also having taken part in discussions with the Swedish workers both in Sweden and in this country, we feel we are in possession of facts which enable us to comment on Dr. O'Connor's letter.

As Dr. O'Connor states, P.A.S. is a white crystalline substance, and we have studied it in this and in other forms. When manufactured on a technical scale it is more conveniently obtained as a pale cream microcrystalline powder of 97–99 % purity, and it has been supplied in this form for the clinical study preliminarily reported on by Dempsey and Logg,[1] who we understand used it as a solution of sodium salt prepared by means of sodium hydroxide.

As you say in your footnote, the Swedish workers have used rather more highly coloured material which produces dark-coloured sodium salt solutions, and we understand that the bulk of their clinical evidence has been obtained with material of this standard of purity. They regard traces of coloured impurity as of little clinical significance, and from present evidence we agree that such impurities, which are present in pharmacologically insignificant amount, have little effect on bacteriostatic activity. We therefore consider there is little justification for the additional processing necessary to produce the material in a white form. Material produced in this country on a semi-technical scale has been examined bacteriologically by Lehmann, who has shown its bacteriostatic activity to be identical with the material he has used throughout his investigations.

Dr. O'Connor's statement that mere solution of P.A.S. in, for example, caustic soda, causes virtually immediate and complete "disintegration" of the substance,

1. *Lancet*, 1947, ii, 871.

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suggesting that the dark solutions of the sodium salt possess little or no activity, should clearly be supported by convincing analytical evidence. The stability of solutions of the sodium salt prepared under widely different conditions, including the use of sodium carbonate, bicarbonate, and hydroxide, with specimens of acid of varying degrees of purity, and solutions prepared from pure dry sodium *p*-aminosalicylate, have received detailed study by us, and we have no evidence to support this statement. Our work will in due course be published in full elsewhere.

The Seitz-filtration method for producing sterile solutions of sodium *p*-aminosalicylate has, of course, been our method of choice throughout the whole clinical study, and it should be noted that one of us (D. E. S.) drew attention to the risk of decarboxylation on autoclaving such solutions during the delivery of Whittet's paper.[2]

The melting-point of P.A.S. is, in our opinion, not a complete guide to its purity unless specially chosen conditions are used for its determination. On heating P.A.S. decarboxylates to yield *m*-aminophenol (m.p. 122–123°C) and with slow heating relatively low melting-points are often observed. The compound can be shown to possess a melting-point of 150–151°C, though such specimens can also be shown to have a lower melting-point with slow heating rates. The melting-point of 140°C reported on by Whittet appears to be the one generally observed when using the normal technique. This point has been borne out in discussions with the Swedish chemists.

We are informed by Dr. Dempsey that results achieved with empyemata have shown that there is no well-marked difference between the use of the sodium salt and of the free acid.

Dr. O'Connor's remarks concerning blood concentration suggest that he is unfamiliar with the clinical use of this material, since the relatively low blood concentrations achieved by oral administration are due to the rapid excretion of the drug.

The Laboratories, Herts Pharmaceuticals Ltd., Welwyn Garden City. D. McANALLY
D. E. SEYMOUR.

FATAL HYPOGLYCÆMIA IN A DIABETIC

SIR,—In your annotation on the case reported by Dr. Winkler (Feb. 7) you draw attention to one aspect which cannot be too strongly emphasised—viz., the danger of giving insulin to a diabetic in coma unless the diagnosis of ketosis is established beyond a doubt. As you observe, deaths in hypoglycæmia are rare except when the coup de grâce is administered by another dose of insulin. May I suggest practical steps to be taken by a doctor called to such a case?

1. The simplest way to distinguish between hyperglycæmic and hypoglycæmic coma is to bend down and smell the patient's breath. With the former the pear-drop scent of acetone establishes ketosis and the need for insulin. In the case in question the scent was absent, but might have been masked by the beer which the man had been drinking.

2. A strong solution of sugar in water or tea (2 oz. sugar in 2 oz. fluid) is given: if he cannot or will not drink, it is forced into his mouth little by little with a teaspoon.

3. An injection of 0·5 ml. of either 1:1000 adrenaline or pituitary (posterior lobe) extract may hasten recovery if the glycogen reserves of the liver are not exhausted.

4. If the patient does not recover, a catheter is passed, either on the spot or after taking the patient home or to a hospital. There may be a little sugar in the urine even in hypoglycæmia, but a large amount of sugar and a positive Rothera's test establish the diagnosis of hyperglycæmic coma and the need for insulin. In their absence more sugar is the only treatment indicated.

Three other points may be mentioned: (*a*) fits suggest hypoglycæmic rather than hyperglycæmic coma; (*b*) the sugar given at once, even if the case proves to be one of diabetic coma, does no harm and is followed by insulin in large doses when ketosis is demonstrated; and (*c*) I would strongly endorse your contention that soluble insulin should be the insulin used in all emergencies.

Hove. G. M. WAUCHOPE.

2. *Chem. and Drugg.* 1947, **147**, 692.

MASS RADIOGRAPHY

SIR,—Dr. Hoffstaedt's article of Dec. 27 seems to me to prove nothing beyond the urgent need for further increase in the number of mass miniature radiography units.

The cases to which he refers were all selected from a sanatorium. He appears to forget the early or minimal cases kept under dispensary observation, and the cases kept on "bed rest" at home under the supervision of the tuberculosis officer. Unhappily, in some areas admission to sanatorium depends on the disease being advanced, or on the occurrence of a medical or social emergency; so the really early case may never enter a sanatorium.

All units receive the same basic training at a centre in London, so they should operate on identical lines. Divergence and error are, however, possible in the direction and the policy of these units, which are operated by local authorities. Some units concern themselves with the detection of pulmonary tuberculosis only, whereas others pay attention to non-tuberculous conditions and also selected cardiac cases, while still others have special clinics for the close observation of cases for diagnosis.

It is wrong to blame the scheme for its slow expansion, since this slowness is due partly to lack of X-ray apparatus and partly to lack of staff. The Minister of Health has lately stated that there will be continued expansion in mass-radiography services.

Dr. Hoffstaedt states later that "active tuberculosis has been found in only 0·4% of all the cases so far examined by mass radiography, and not nearly all of these have been symptom-free." Surely he realises that these cases are obtained from the "apparently healthy" volunteers whose symptoms, if any, are so trivial as not to arouse their anxiety; but for mass radiography the condition would remain undiagnosed until increasing symptoms caused the patient to see his doctor. More often than not these patients are at first well nourished and feel perfectly fit. The mass-radiography unit also picks up advanced cases which have been completely unsuspected, thus removing a potential source of infection, opening the way to treatment, and enabling the tuberculosis officer to investigate contacts.

The City of Nottingham mass-radiography unit began operations in May, 1944. It was realised at the outset that it was impracticable to examine the whole population (280,000); with a single unit to do so once would take 5–6 years. The policy laid down at the beginning, on the advice of Dr. R. R. Trail, was of regular periodic surveys of selected groups—i.e., school leavers, university students, the police, fire brigade, miners, teachers, nurses, and workers in factories which employed many people of the 14–25 age-group or in which the industrial risk was considered high.

From the beginning the examination of contacts was undertaken on behalf of the city tuberculosis officers. These are first investigated at the dispensary; if the clinical and large-film radiographic examination are negative, the contact is referred at regular intervals for miniature X-ray examination at the mass-radiography centre. This gives the tuberculosis officers more time to treat proved cases of tuberculosis.

All maternity cases attending antenatal clinics in this city have a miniature X-ray examination of the chest as a routine part of their antenatal examination; this has worked extremely well through the keen coöperation of the staff of the maternity section.

Special sessions are held for patients referred by their doctors on account of trivial symptoms; these sessions are well attended.

Our unit was the first to hold "public sessions," which started from the day the unit opened. These are for members of the public who would like a free X-ray examination of the chest, without a previous appointment; they have proved most successful. Our first series lasted six weeks, during which the incidence of active tuberculosis among the volunteers rose from 3 per 1000 to 6 per 1000, while the number of cases of bronchial carcinoma detected was appreciable.

No-one in this city need go without X-ray examination of the chest. Moreover, I cannot speak too highly of the splendid coöperation between general practitioners and our centre. I feel, too, that I must pay tribute to industrial firms for their continued eager and generous support in these

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trying times of export drive, fuel cuts, five-day working week, absenteeism, and increased wages.

What of the future? In my opinion, mass radiography, if wisely handled and well organised, will be a powerful aid in the detection of early pulmonary disease. I have no doubt that it is the most effective weapon so far evolved for the fight against pulmonary tuberculosis.

A. E. BEYNON

Nottingham. Medical Director, Chest Radiography Centre.

SIR,—Most of the correspondents who have commented on Dr. Hoffstaedt's article (Dec. 27) seem to take the view that mass radiography has little value.

I myself agree with Dr. Pointon Dick (Jan. 17) on the importance of identifying symptom-free cases; how can these cases be discovered except by mass radiography? The "healthy" man or woman is unlikely to make an appointment for X-ray examination of his chest. Further, as Dr. Dick says, the "picking-up" of these early cases prevents re-stocking of the infector pool.

I cannot agree, as some of the writers have hinted, that the small number of cases discovered by such an expensive machine implies waste, because with it we have picked up not only early and probably non-infective cases but also those with a positive sputum, and have thereby removed from factory and family a source of danger. Often patients in this second group are under treatment for "bronchitis" or have dismissed their symptoms as those of a "smoker's cough."

I agree that mass radiographic examination should be repeated at short intervals. In yearly surveys we have found at least 3 cases of tuberculosis which developed between one examination and the next.

"Tuberculosis Officer" (Jan. 17) mentions that the patient's doctor is usually the first to suspect that something is amiss when the patient complains of "mild symptoms"; but surely X-ray examination at shorter intervals would obviate this group.

Personally, I think we should look upon mass radiography in the same way as we regard immunisation against infectious diseases—as a means of prevention, even if it is expensive.

Mass Radiography Unit, Northampton. W. T. BERMINGHAM.

KHELLIN IN ANGINA PECTORIS

SIR,—I should like to comment on your annotation [1] on khellin, the active principle of *Ammi visnaga*, which was found by Anrep and his colleagues [2] to be a very potent coronary vasodilator, safe to administer by mouth as well as parenterally; its use was reported by them in a large group of cases of angina pectoris and bronchial asthma, with extremely encouraging results.

I have used khellin over a period of one and a half years, through the courtesy of these authors and later of the Alpha Laboratories, Cairo, which manufacture the drug under the name 'Ammicardine'; and I have applied the drug in the treatment of 23 cases of angina pectoris.

All patients except 2 were men. Their ages ranged from 45 to 72 years. In 3 angina developed after coronary thrombosis; the remaining 20 had primary angina pectoris. The length of the anginal history varied from six months to eight years: and in 16 patients it was between one and five years. Hypertension was present in 16 cases, and the Wassermann reaction was positive in 1. The electrocardiogram was abnormal in 17 cases, 2 of which had bundle-branch block.

The dosage applied was the same as that suggested by Anrep and his associates. Intramuscular injections containing 100 mg. khellin were given once daily in mild or moderate cases and twice daily in severe cases for two weeks. The treatment was continued with the tablets, which contain 50 mg. khellin and were given after meals three times daily. Observation lasted between two and three months in 10 cases and between six and eight months in 9 cases. The attacks disappeared completely in 14 cases (61%), marked improvement occurred in 5 cases (22%), and the treatment failed in 4 cases (17%). Improvement was usually observed 5–10 days after the administration of the drug; but in 5 cases the response was prompt.

The success achieved in 83% of cases cannot by any means be ascribed to suggestion or to a placebo effect. The drug did not produce any toxic effects.

I am also using khellin in bronchial asthma, renal colic, and whooping-cough with encouraging results.

Cairo. HOSNY AYAD.

1. *Lancet*, 1947, i, 682.
2. Anrep, G. V., Barsoum, G. S., Kenawy, M. R., Misrahy, G. *Ibid*, p. 557.

NEW ZEALAND DENTAL SERVICE

SIR,—I hope the following quotations will satisfy Sir Ernest Graham-Little (Feb. 7) that New Zealand dentists do, as I said, approve of payment by salary in the national dental service. Mr. W. B. Tennent,[1] in his presidential address to the New Zealand Dental Association last year, said:

> "I would remind you that a few years ago, when this proposal [for an adolescent service] was first considered seriously, this association recommended the establishment of a salaried service to carry it out; and it must be clearly understood that the present fee-for-service scheme is merely a temporary one to carry over until there is sufficient personnel to put the salaried scheme into operation."

The report of the Division of Dental Hygiene for 1946–47 says [2]:

> "The invitation to dental practitioners to undertake service under the scheme met with an immediate response and by 31 March, 1947, two months after the inauguration of the system, 70% of the private practitioners had offered to accept patients and offers were still being received."

The fee-for-service system of paying doctors has admittedly not worked well, but it is very like the grant-in-aid system for dentists proposed by the B.D.A. and rejected by Mr. Bevan. His plan for a fixed itemised scale of fees, with no extra charge to the patient, is like the one which the New Zealand Dental Association have agreed to as a temporary measure. The B.D.A. have pointed out some obvious disadvantages of this method; but capitation, though it has been tentatively suggested in both countries, is not considered workable at present, presumably because real preventive dentistry is still in its infancy. Far from revolting against salaried service, the B.D.A. have always pressed for the expansion of the salaried service for children and mothers and its extension to adolescents. It is only the shortage of dentists that prevents this; a complete service for the priority classes would easily absorb the whole of the profession unless auxiliaries were employed on a large scale.

The New Zealand Dental Association certainly approve of the employment of dental nurses, and the following quotations also show that the expression "lay workers" is misapplied. Mr. Tennent in the address quoted above also said, of the School Dental Service:

> "By careful selection of personnel, by specialised and intensive training along specialised lines, excellent results have been obtained. When the scheme was first introduced the ratio of extractions to fillings was 114·5 to 100; today the ratio is 6·3 extractions to 100 fillings. Truly a splendid result and one which fully justifies the foresight of the association and the wisdom of the first director, now Sir Thomas Hunter, and his successor Mr. J. Ll. Saunders."

Mr. F. B. Rice,[3] as principal of the Dominion Training School for Dental Nurses, said at the graduation ceremony last year:

> "Two main factors have built up the enviable reputation of the service—good operative work and the sympathy and consideration shown in handling patients."

The transfer of denture fitting is a rather different matter. Auxiliaries were allowed to care for children's teeth, because dentists could not or did not do so. The Parliamentary committee referred to by Sir Ernest Graham-Little also received a petition from 400 members of the public complaining of the high cost of dentures; the dentists are now being asked to give up a part of

1. *N.Z. dent. J.* 1947, 43, 173.
2. *N.Z. School dent. Serv. Gaz.* September, 1947.
3. *Ibid.*

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their practice because their fees are so high, and naturally they are not enthusiastic. However, no-one has yet attempted to make out a case against the employment of trained technician-prosthetists working under supervision. The Dental Board, in its evidence to the Teviot Committee, advised that if, in the public interest, the Dentists Act had to be amended to allow more delegation, then this sort of delegation should be permitted.

London, N.W.6. R. B. D. STOCKER.

MISTAKES WITH INJECTION SOLUTIONS

SIR,—The distinctive tinting of solutions for injection suggested by Mr. Dodd (Feb. 7) as a safeguard against mistakes might, I fear, only introduce a new hazard.

How many people have a sense of colour perception and a memory for shades sufficiently acute to allow them safely to differentiate between perhaps twenty to thirty colours? I imagine that this number of shades would be required if one wished to cover the commonly used injections. There would be the further problem, moreover, of identifying different concentrations of certain solutions.

I doubt if there is any way of increasing safety in administration of injection solutions other than by observing the precautionary measures already in force. Of these, the most important are: (1) that the manufacturer or pharmacist shall label the solutions clearly, and (2) that the doctor or nurse administering the injection shall first read the label. If a label has become detached and one cannot be sure of the nature of the solution, it should not be injected.

Glaxo Laboratories Ltd., Greenford, Mddx. H. M. WALKER.

FOOD FOR OLYMPIC ATHLETES

SIR,—Dr. Leyton's letter (Jan. 24) raises an important point. He asks for 3750 calories, and especially for more fat and protein, in order to avoid staleness and muscle breakdowns.

Indeed, Olympic athletes seem to like ample food. Schenk [1] has found that at the 1936 olympiad the average consumption was 800 g. meat, 2–3 eggs, 100–150 g. butter, and 1 litre milk, apart from plenty of sugar and other carbohydrates, fruit, and vegetables. Is this calorie intake of 4000–5000 a day really necessary, or is it perhaps only an easily acquired and enjoyable habit? There is no experimental evidence, and we must remember that competitive games and athletics are carried on with remarkable results in European countries which are much worse fed than we are. It may well be that muscular work carried to the limit of endurance calls for different supplies; there is, however, just as little evidence for this as for the statement that staleness and muscle breakdowns are caused by their lack. Our deplorable ignorance in this field is due to the fact that very few members of the medical profession have shown an active interest in it. Even the organisation committee of the Olympic games do not seem to be keen to stimulate such interest, since they have rejected a suggestion for a conference of physicians and physiologists during the coming games. It is to be hoped that individual initiative will overcome inertia one day and will give a new impulse to research into this most interesting subject.

London, W.C.1. H. HERXHEIMER.

HEALTH EXAMINATIONS

SIR,—In the ophthalmic sphere there is everything to be said for regular inspections; and by that I mean proper tests—not merely a check on Snellen test type. The alarming percentage of adults with amblyopic eyes is due mainly to the lack of proper periodical inspection of school-children's eyes. That this problem is not confined to children is shown by the results of Dr. Parnell's pilot survey at Oxford (Dec 27), in which 55% of the students examined were found to have visual defects. At one end of the scale, routine examinations would discover incipient squints at the time when they are readily susceptible to treatment; and in middle-age glaucoma would lose much of its terror, for treated early this seldom causes much depreciation of visual acuity.

Association of Optical Practitioners, London, W.1. S. BLACK.

1. Schenk, P. *Münch. med. Wschr.* 1936, 83, 1535.

GERIATRIC THERAPY

SIR,—In acknowledging congratulation on attaining octogenarian status, a relative sends the following list of the treatments she is at present receiving. How will it read in, say, a further half century?

Thrice daily: Mist. sod. cit. et hyoscy.
Stomach concentrate with iron and vitamin B.
Once daily: Digitalis.
Once or twice daily: Antidiarrhœa mixture.
Nightly: 2 sedative tablets.
As required: Pethidine.
Sulphapyridine (if the temperature rises).
Hæmoplastic serum.
Nikethamide.
Weekly: a liver injection.

Northwood, Mddx. ESTHER CARLING.

EFFECTS OF MYANESIN ON MUSCLES AND BLOOD

SIR,—In view of the recent interest in 'Myanesin' as a drug alleged to produce muscular relaxation, and in its apparently unforeseen hæmolytic properties, we would like to record some observations made here some months ago.

1. *Effect on Voluntary Power*

Doses of myanesin were given intravenously to two patients suffering from poliomyelitis that had caused extensive paralysis of the lower limbs, with painful limitation of certain joint movements, thought to be due to muscle spasm. One patient was a man of 33, the other a girl of 17; on account of their extensive disability it was not possible to weigh either, but both were of normal build. The man received 35 ml. of the 10% solution, and the girl 20 ml., at the rate of 5 ml. per minute, with an interval of 3–4 minutes between each 5 ml. dose. The only other drugs given were 'Omnopon' gr. $^1/_3$ and scopolamine gr. $^1/_{150}$ injected subcutaneously shortly before administration of the myanesin.

The effects of the drug were almost identical in the two cases. The pulse-rate remained steady throughout, though during the injections there was flushing of the face in both cases and of the whole body in the girl. Voluntary power, whether in normal muscles or in those partially affected by the disease, was unchanged throughout. Electromyographic recordings (hamstrings in the girl, erector spinæ in the man) were unchanged throughout. The painful limitation of movement was unaffected, as were all tendon reflexes. Both patients complained of blurring of vision during the injections. Both patients had intense hæmoglobinuria after the injections. No good or ill effects have been noted subsequently.

2. *Effect on Red Blood-cells and Plasma Protein*

In view of the observation that patients receiving myanesin developed hæmoglobinuria, its action on human blood in vitro was investigated. Dilutions of myanesin were made (*a*) in normal saline and (*b*), in view of its acid pH, in isotonic buffered saline at pH 7·2. To 1 ml. of the full strength and diluted solutions was then added 0·1 ml. of (1) fresh whole citrated blood, and (2) washed red cells in normal saline. The mixtures were incubated at 37°C. Complete hæmolysis occurred in all tubes within an hour up to a dilution of 1/8, and 25% hæmolysis occurred within 24 hours up to a dilution of 1/32. The hæmolysis was as pronounced in the whole-blood as in the red-cell suspensions and in the buffered as in the unbuffered dilution. It was also observed that rapid precipitation of protein occurred in the whole-blood preparation up to a dilution of 1/4. A similar effect was obtained with human serum and plasma.

The hæmolytic effect of the drug was then tested in vivo as follows. A man with complete brachial-plexus paralysis, necessitating amputation of the otherwise healthy arm, was selected as a suitable subject. A sample of venous blood collected from this limb showed no hæmolysis. Before proceeding to the definitive operation the flaps were marked out at a point 7 in. below the acromial process and dissected proximally. The blood-flow through the cephalic and basilic veins was placed under control and one of the veins accompanying the brachial artery was occluded. The other vein was dissected free over a length of about 3 in., and after being divided superiorly was allowed to hang down and was occluded with a light spring clip. Thus, after occlusion of the other three veins, one could be reasonably certain of collecting most of the blood from the periphery of the limb by releasing the clip on the brachial vein. This having been done, 10 ml. of myanesin was injected into the brachial artery, and blood

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samples were taken into dry, sterile containers 45 and 85 sec. after the injection. After an interval of 5 min., 15 ml. of myanesin was injected as before and samples of blood were collected after 40 sec. and after 2 min. 10 sec. The blood samples were all centrifuged within an hour of collection, and in all of them the supernatant serum showed evidence of gross hæmolysis, this being greatest (amounting to 25%) in sample no. 3, the one collected 40 sec. after the second injection of myanesin.

D. M. BROOKS
ELIZABETH HANDFIELD-JONES
R. G. MACFARLANE
H. J. SEDDON.

Wingfield-Morris Orthopædic Hospital, Oxford.

NATIONAL HEALTH SERVICE

SIR,—In a series of rather woolly leaders in which THE LANCET has been cast for the rôle of elderly governess wringing her hands over a quarrel between two fractious and unruly small boys, it has been stated more than once that, whatever else he may be, Mr. Bevan is a jolly clever chap (or words to that effect). Now, Sir, to attempt to organise and run a service of any kind and succeed only in antagonising the majority of those who are to work the service does not strike me as particularly clever.

And now a word with Mr. Layton. If it were true that "a section of the community" was merely placing "the personal œconomy of its members, and the traditions of its class, before the good of the nation" he would have a case. But it depends what you mean by "the good of the nation." If, as nearly all agree, the nation requires a new medical coat, would it not be better to have one made to measure rather than one off the peg which has to go back repeatedly for alteration and even then never really fits?

Crediton. L. N. JACKSON.

HEALTH CENTRES

SIR,—While interest centres around the B.M.A. plebiscite, the brief circular 3/48 issued by the Ministry of Health [1] has passed almost unnoticed. In it the Minister declares that there will not be any general provision of health centres for the time being, and local authorities are excused the necessity of submitting proposals for the building of health centres. No indication is given as to how long it will be before the Minister will be able to implement this section of the Act.

The effects of this upon general practice as it will affect the younger generation of doctors are enormous. Over 95% of G.P.'s will continue to own the premises from which they practise, even after the abolition of the buying and selling of goodwill. They will also own all equipment which they may have, and be financially responsible for the provision of secretarial or other ancillary staff required to improve the service they offer. When a doctor retires, the premises and equipment and in fact the whole "business" enterprise will have to be sold to a successor at the market rate. Unless health centres are put up on a wide scale and the younger men are encouraged to enter them, a new type of capital value in medical practice will be built up and a new generation of doctors will be reared who own medical facilities for which further compensation will one day have to be paid.

If the Minister endeavours to prevent this process by using the special clauses in the Act by which he may penalise a doctor selling his house above the market rate, a worse situation will be created. The best general practitioners are those who plough back their profits to purchase new equipment and build up their practice as a more efficient medical service. If the only effect of doing this is to cause a man to be penalised, general practitioners will not spend money on giving a better service and the standard of general practice will fall to a low level.

The essential point in the advancement of the character of general practice today is the development of the health centre. This will promote coöperation among practitioners and place at their disposal expensive modern equipment. The fact that the premises and most of the equipment will be publicly owned will eliminate the commercial element from medical practice and bring payment of the doctor down to payment for service alone. This is not going to take place now, and practitioners will have to carry on in the old way, improving the service they can offer by purchasing new instruments out of profits.

Thus the commercial basis for general medical practice largely remains, and it seems rather unnecessary therefore that the Minister should still refuse to give way on the last remaining bone of contention between himself and the B.M.A.—the buying and selling of practices. If we are not going to have health centres, other than on an experimental scale, there is no point in abolishing this time-honoured custom.

I have supported this Act from the beginning, and I still believe it to be a big step forward, but we shall have to wait until another generation has passed down the road before we can develop in this country that new type of medical practice which we have all wanted so much.

London, S.E.24. P. W. ROE.

1. See *Lancet*, Jan. 24, p. 161.

ANKYLOSING SPONDYLITIS

SIR,—I read with pleasure in your issue of Jan. 3 the helpful article by Dr. Lennon and Dr. Chalmers. They emphasise the frequency of pain in the thighs: "pain often radiates from the back to one or both buttocks or thighs"; and I take this to mean the back of the thighs. I have found sciatica to be a prominent, and sometimes the presenting, symptom of ankylosing spondylitis. This sciatica has characteristics which help to differentiate it from that of the prolapsed intervertebral disc. Both conditions are common in young Servicemen and both may manifest themselves by low backache with stiffness and sciatica; but with ankylosing spondylitis the pain is often bilateral and it extends only to the knee.

I have often wondered why, in ankylosing spondylitis, pain is commonly felt only as low as the ham. In the early cases where radiological changes are confined to the sacro-iliac joints, is this sciatic pain due to involvement of the lumbosacral trunk lying in front of the sacro-iliac joint, and if so why is the pain not referred more often below the knee?

Again I agree with the authors about the dangers in diagnosing "lumbar fibrositis." However, I do feel that sometimes no better diagnosis can be reached. Here also, in the apparent absence of other lesions, pain may be referred in the sciatic distribution as far as the thigh only. Such cases may be examples of a disease process (whatever it be) which either develops into ankylosing spondylitis or becomes arrested even before radiological changes are evident in the sacro-iliac joints.

I have not infrequently seen cases of low backache, with pain down the posterior aspect of one or both thighs, fibrositic nodules in the lumbar aponeurosis and sacro-iliac regions, no limitation of movements, and no radiological changes in the intervertebral or other joints. Sometimes I have had the advantage of seeing such patients with Dr. F. S. Cooksey, but we have been unable to suggest a better diagnosis than "lumbar fibrositis." Many of these have been observed for some years, during which there has been no further development in the condition.

London, W.1. E. J. RADLEY SMITH.

DISCLAIMER

Lord HORDER writes: "An article entitled 'The Doctor,' accompanied by a photograph of myself, appeared in the Feb. 8 issue of the *Leader*. I shall be grateful if you will allow me to say, through your columns, that the article appeared without my knowledge or concurrence. On being approached, the Hulton Press declines to state this fact in the journal where the article was printed."

FATALITIES FROM TRIDIONE

Referring to our annotation of Feb. 7 (p. 221), Messrs. Abbot Laboratories Ltd. point out that their booklet on 'Tridione' contains a clear warning of the dangerous side-effects which occasionally arise during treatment with the drug and recommends that "the formed elements of the blood and hæmoglobin of patients under Tridione therapy should be checked at not less than monthly intervals and the patient should be instructed to report any symptoms suggestive of a blood dyscrasia."

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Parliament

FROM THE PRESS GALLERY

The Children Bill

IN the House of Lords on Feb. 10 Lord JOWITT, the Lord Chancellor, moved the second reading of this Bill, which he believed would prove uncontroversial. Not everything was bad about the care of children, but there were bad spots. The problem was to save those children who had not the benefit of a normal home life from suffering that disadvantage throughout their whole lives. The purpose of the Bill had been well defined as "an effort to make nobody's child somebody's child." The Government would be glad to consider any amendments which were designed to make the measure as good as it could possibly be. After briefly summarising the provisions of the Bill [1] he added that he realised it was one thing to pass an Act of Parliament and quite another to get effective work done under it, and he stressed the need to provide workers in child care. Everything must be done, he added, to see that this Bill did not become a dead letter, but that it provided the opportunity and incentive for people to work in what was the noblest cause of all—that of looking after children.

Speaking in the course of the debate Lord AMULREE welcomed the encouragement given to local authorities to place children in a series of homes and grouped together in fairly small communities. It was important, he held, that children should be kept in fairly small groups, 9 or 10 at the outside, of both sexes and of all ages, so that they might get a simulacrum of normal family life. At present there was a strong tendency to aggregate the children in nursery accommodation from which they were moved at two and a half or three years. That, from a medical point of view, was not wise, because where there was a collection of from 40 to 50 children, extremely susceptible to infection, they had to be kept together very carefully. He was delighted that the voluntary homes and societies, which had done a great deal of good in the past, were to be recognised. Nobody would object to their being subject to inspection, which was essential where the welfare of children was concerned.

QUESTION TIME

Admission of Foreign Doctors

Mr. B. LEVY asked the Home Secretary to what extent, in considering permits for foreign doctors, he was guided by the advice of a medical committee; what were the principles on which this committee operated; how it was appointed; and who were its members.—Mr. C. EDE replied: In controlling the admission of foreign doctors to take employment or set up in practice in this country I am advised by a committee (known as the aliens committee) of the Central Medical War Committee, a body widely representative of the medical profession which was set up by direction of the Committee of Imperial Defence to advise on the utilisation of the medical man-power of this country. The main committee is reappointed annually and its membership is approved by the Minister of Health. As regards foreign doctors already accepted as residents here, the aliens committee is asked for its views on the suitability of the proposed employment or the location of the proposed practice; as regards foreign doctors who have been admitted to this country for some temporary purpose and then ask permission to practise, the aspect on which the committee advises is the value of the contribution which the practitioner in question is able to make to the medical knowledge and services of this country. The constitution of the committee is as follows:

Mr. H. S. Souttar (chairman of C.M.W.C. ex officio); Sir Arthur MacNalty, Sir Alfred Webb-Johnson, Mr. J. M. Wyatt (representing Royal Colleges); Dr. H. Guy Dain, Dr. L. Haden Guest, Dr. F. Gray, Prof. Samson Wright, Dr. J. A. Brown, Dr. J. C. Matthews, Dr. T. MacCarthy, Dr. J. M. Johnstone (representing B.M.A.); Dr. J. A. Struthers (representing Society of M.O.H.'s).

Representatives of the Home Office and Ministry of Health attend meetings as observers and for the purpose of giving the committee any information they may desire.

Inspecting Meat

Mr. N. N. DODDS-PARKER asked the Minister of Health whether his attention had been drawn to the growing number of cases of ptomaine-poisoning and other gastric complaints among persons of all ages throughout the country; and to what he attributed the cause.—Mr. A. BEVAN replied: Yes, Sir, but gastric complaints can have many causes. The increase appears to be due more to so-called gastric influenza, presumably due to infection with unknown viruses, than to food-poisoning.

Mr. DODDS-PARKER: Will the Minister inquire to what extent this is due to the deterioration in meat owing to the laxity of inspection which is the result of bulk purchase?—Mr. BEVAN: I consider that a most wicked and frightening insolence which ought not to be made by any responsible member of Parliament without direct evidence. No prima-facie case has been established to show that there is any lack of inspection of bulk-purchase meat except the irresponsible statement of the hon. member.—Mr. W. S. SHEPHERD: Do I understand that the Minister assures the House that the standard of inspection and of rejection of meat is today equal to what it was before the war?—Mr. BEVAN: Better.

Exchange Control Medical Advisory Committee

Mr. H. M. MEDLAND asked the Chancellor of the Exchequer if he was aware that the Exchange Control Medical Advisory Committee, whose duty it was to scrutinise medical certificates required by patients before and during their stay in sanatoria in Switzerland to enable them to maintain themselves and pay for the necessary maintenance, were in some cases asking for a fee of four guineas and if he would order this practice to cease.—Mr. GLENVIL HALL replied: I have this matter under urgent consideration and I hope to be able to devise some alternative method.

Authors' Fees

Colonel M. STODDART-SCOTT asked the Minister of Health whether those doctors and dentists who entered the National Health Service would have freedom to publish articles and books with regard to the organisation and administration of the Health Service and freedom to publish such articles without having to seek permission of individuals or authorities.—Mr. BEVAN replied: So far as I am concerned, yes.

Ownership of Patients' Records

Sir E. GRAHAM-LITTLE asked the Minister with whom the ownership of records of patients made by doctors in the Service under the new Act remained, and what precautions were taken to avoid breach of professional secrecy by those records coming into the possession of persons other than the doctor in charge of the patient, and without the consent of the patient.—Mr. BEVAN replied: The arrangements will be substantially the same as they have been under the National Health Insurance Acts.

Grant for Health Education

Replying to a question, Mr. BEVAN stated that the Government had given an undertaking to meet the deficit of the Central Council for Health Education during the current year, subject to a maximum grant of £15,000. The object was to help the council to coördinate and provide advice and material for local authorities' health education work.

Health Centres

Sir E. GRAHAM-LITTLE asked the Minister of Health, in view of his announcement in circular 3, 1948, that health centres must be indefinitely postponed, what arrangements he was making for those young doctors who might be willing to accept service under the Act to be equipped with surgeries; and what arrangements, in view of the present building situation, he was making to provide the greatly increased institutional treatment promised by the Act.—Mr. BEVAN replied: No immediate substantial increase of building work under the Act has ever been promised or regarded as feasible, but I have made it quite clear that building development in all fields of the Act will be carried on as fast as conditions allow.

Hearing-aid Research

Mr. F. J. ERROLL asked the Lord President of the Council what steps he had taken to improve the 'Medresco' hearing-aid by further research and development work.—Mr. H. MORRISON replied: Until there has been practical experience of the model now in production the question of improving the design does not arise, but the scientific committee concerned is already considering proposals for new types of receiver and the possibility of other instruments for forms of deafness requiring special treatment.—Mr. ERROLL: As the Government model is already out of date, as a result of

1. *Lancet*, Feb. 7, p. 222.

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research and work by private firms on their instruments, cannot the Minister devise a better research policy in regard to this instrument?—Mr. MORRISON: I will do my very best to do so.

Obituary

VINCENT SUTHERLAND HODSON

M.V.O., B.A., D.M. OXFD, F.R.C.P.

Dr. V. S. Hodson, consulting physician to the London Chest Hospital and a former assistant director of the Sudan medical department, was educated at Christ's Hospital and at Oxford. He took his B.M. in 1900 from St. Thomas's Hospital, and after holding house-appointments there he became resident medical officer at the Kasr-el-Ainy Hospital in Cairo. Later he joined the Sudan medical service, and was appointed director of the Khartoum Civil Hospital. During the 1914–18 war he served as civil surgeon with the Mediterranean Expeditionary Force, and later he returned to London where he became senior medical representative of the Sudan government. At that period St. Thomas's was short of staff, and for a time he lent a hand in the outpatient department there. In 1927 he took his D.M. and the following year he was elected F.R.C.P. He joined the staff of the London Chest Hospital as one of three tropical physicians—the other two being Rear-Admiral Sir Percy Barrett-Smith and Dr. J. B. Christopherson. He had had exceptional experience of tuberculosis in the tropics, and in those early years after the first world war, when undiagnosed tropical diseases turned up not infrequently in the hospital wards, he found a useful niche. As secretary of the medical committee his minutes were models of correctness.

Hodson also did a good deal of medical referee work for civilians going to and from appointments in the Near East. Towards the end of his career he became a lecturer of physic at Gresham College. He took great interest in this appointment, and, if the war had not intervened and his health had not deteriorated, he would have made it a real live job instead of a venerable appointment for those who have done their life's work. His family had been associated with the Mercer's Company since Elizabethan days and he took great pride in his connexion with this City company. In due course he became master, served on its many committees, and was a governor of St. Paul's School.

For some years Hodson played golf regularly at Northwood, and took a share in boys' club work in a London settlement, but shortly before the outbreak of war he developed angina and retired to a cottage near Horsham. He came up to town occasionally and met old friends, but his active work was obviously over and he died on Feb. 9, at the age of 73.

S. R. G., to whom we are indebted for much of this memoir, writes: "Hodson made no pretensions to a modern scientific background and was well content to teach and practise sound clinical medicine. Not given to heroic remedies, he preferred to watch and wait, and he was rarely wrong in his diagnoses, once he had made up his mind. It was probably at Khartoum that he acquired the art of straightforward teaching, simple and unadorned; and he had a real gift for making a subject clear and understandable. It was part of his frank sane outlook on life. He disliked intensely fanatical views, devious thinking, and unbalanced judgments. On the personal side his strongest point was his intense interest in human nature. Nothing aroused his indignation more than to see anybody neglect the human side of his patients. As a result his patients worshipped him and his housemen became his friends. He was a great raconteur, and tea-time in the hospital staff-room was enlivened once a week at least with stories of Egypt and the Sudan."

"'Doc. Hodson,'" adds N. F. S., "was the life and soul of any meeting of his fellow men. If his tongue was sharp on occasion, the twinkle in his eye never failed. 'Are you sure,' I heard him ask a timid Sudanese ripe for appendicectomy, 'that the sun will rise again in the east tomorrow morning? So sure am I that this operation will cure you.' Apart from his official duties in the Sudan he would devote much of what might have been his leisure time to helping the small native schools, missionary societies, and other charitable organisations. On one occasion he was presented by two grateful nuns with a hand-made cushion and the assurance that he was never forgotten in their prayers. In accepting the cushion he begged them not to attract too much attention to him in their prayers.

"An extract from a letter I received from him shortly before his death was characteristic. 'Another excitement was a lunch party I gave. . . . Our total ages (5 persons) were 375 and I was the youngest. Were we silent? Apart from flashing eyes and noisy laughter all went very well. Sixty-eight years of friendship from age 5 on is not too bad.' Nobody privileged to be included among his friends need ever have feared to be forgotten."

OLAF GLEESON

L.R.C.P.

Dr. Olaf Gleeson, who died on Jan. 7, was an advisory member of the Health Education and Research Council, and physician to St. Margaret's Hospital, Doddington, and the St. Francis Clinic, London. He studied at King's College and Westminster Hospital, qualifying in 1915. After serving with the R.A.M.C. in France he set up in general practice in Portsmouth. Latterly he had practised as a psychotherapist in Harley Street. In 1940 his memoir of Dr. Wilhelm Stekel appeared, and he had also published a paper on dream interpretation.

Mr. G. H. Colt writes: "John Gleeson was a 'round' man from whose presence the mistaken value (and the ill health or unhappiness that it occasioned) 'shrank like a thing reproved.' Knowledge without wisdom, specialism without comprehensiveness, craft without love, sociality without companionship—such vanities could not flourish in his presence, because they were not in him. He influenced chiefly by example. Simple at heart, though complex and abundant in his external manifestations, he was full of zeal for work and zest for pleasure—sailing in a home-made boat, holiday-making in a home-made caravan, somersaulting in a home-made motor-car! He cultivated tomatoes hydroponically and fashioned furniture of such excellence that he was filmed by Gaumont-British as a master of the craft. In his workshop, the materials of an artist; in his study, the products of his pen. In the man himself, the quality of heroism—fully revealed when disablement and pain were faced with a fortitude that his friends will not forget."

Mr. G. K. RIDDOCH, elder son of the late Dr. George Riddoch, was among those reported missing in the air liner lost near Bermuda on Jan. 30. From the University of Cambridge he went to the London Hospital, and after taking the Conjoint qualification and his M.B. Camb. in 1941, he worked at the sector hospital at Chase Farm. During the late war he served in the Royal Navy, and after his return to civilian life he obtained the Edinburgh fellowship in 1946, and took up a surgical appointment at the West Middlesex Hospital. Keith Riddoch was 30 years of age and he leaves a widow with one child.

Appointments

FANNING, JAMES, M.D. Lond., D.P.H.: asst. county M.O.H., Surrey.
GARLAND, H. G., T.D., M.D. Leeds, F.R.C.P.: physician i.c. department of neurology, Leeds General Infirmary.
HAMILTON, W. F., M.B. Edin.: pathologist i.c. laboratory, Ashford County Hospital.
LEIPER, JOHN, M.B. Lpool, D.P.H.: M.O.H. and divisional M.O., West Riding, Yorks.
MOCKLER, ELIZABETH, M.B. N.U.I.: asst. M.O. for maternity and child welfare, Lincolnshire.
ROSE, W. L., M.SC., M.B. Sheff.: pathologist, Clayton Hospital, Wakefield.
TAYLOR, G. C., M.B. Glasg., D.P.H.: deputy M.O.H. and deputy school M.O., Chester.

Hospital for Sick Children, Great Ormond Street:

Outpatient Medical Registrars:
KEMPTON, J. J., M.B.E., M.D. Brist., M.R.C.P., D.C.H.
WELLS, DOROTHY, M.B. Birm., M.R.C.P., D.T.M. & H.

Manchester Royal Infirmary:

Assistant Physicians:
HOWAT, H. T., M.B. St. And., M.R.C.P.
JONES, A. M., M.SC., M.B. Manc., M.R.C.P.
SMYTH, G. G. E., M.D. Manc., F.R.C.P.

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Public Health

Statistics for 1945

THE medical section of the Registrar-General's review of 1945, published some months ago,[1] has now been followed by the civil section.[2] The birth-rate for the year was 15·9 per 1000 population—a rate lower than that for 1943 and for 1944, partly explained, it is suggested, by the absence abroad of a larger number of members of the Forces after D-day. The rate for 1945, though the highest since 1930 with the exception of the two preceding years, was the lowest among the principal British and foreign countries except Belgium (15·5); subsequently, however, the rate rose to 19·1 in 1946 and to 20·5 in 1947. In 1945 illegitimate births numbered 63,420, or 9·3 % of all live births, the highest percentage ever recorded in England and Wales, comparing with a pre-war average of 4·2 %. The stillbirth-rate—28 per 1000 total births—was the same as in 1944; before that it had fallen gradually from a pre-war average of 40.

The marriage-rate, having risen to a record peak of 22·5 per 1000 in 1940 and then dropped to 14·1 and 14·3 in 1943 and 1944, rose sharply to 18·7 in 1945, when 397,626 marriages were registered. The most popular age for marrying was 24 for men and 21 for women; and the most popular combination of ages was 22 for men and 21 for women. The mean age at marriage of men was 28·8, and of women 25·9. After 1941 the number of divorces rose steadily; in 1945 15,634 decrees were made absolute, compared with an annual average of 6646 between 1937 and 1941.

New Tuberculin Test for Cattle

A circular issued by the Department of Health for Scotland says that the tuberculin test on dairy cattle may now be made either by the double intradermal method as hitherto, or by the method of the single intradermal comparative test. Experiments are said to have shown "a close similarity between the results yielded by the two tests"; and "in attested and tuberculin-tested herds the single intradermal test gave the more accurate results in the few discrepant cases that occurred."

Diphtheria in 1947

A new low record for diphtheria was set up last year for London and the 126 great towns of England and Wales. According to provisional returns, 6775 cases were reported—4492 fewer than in 1946. There were 128 deaths, compared with 239 in 1946.

For the whole of England and Wales average figures before the war were 58,000 cases and 2800 deaths per year. Since 1941, when the national campaign against diphtheria opened, there has been a steady decrease; in 1946 there were 18,284 cases and 472 deaths. By the end of June, 1947, nearly 7,000,000 children had been immunised under local-authority schemes. The aim is to ensure that at least three out of every four babies are immunised before their first birthday.

Poliomyelitis and Polioencephalitis

After the rise in the previous week, the week ended Feb. 7 showed a substantial fall in notifications of poliomyelitis from 49 to 25, while notifications of polioencephalitis rose from 4 to 6. The counties with more than one notification were:

	Poliomyelitis	*Polioencephalitis*
London	1 (6)	.. 3 (0)
Essex	2 (2)	.. 0
Hertford	2 (0)	.. 0
Lancaster	1 (4)	.. 1 (2)
Middlesex	4 (5)	.. 0
Shropshire	2 (0)	.. 0

Figures for the previous week are given in parentheses.

Egyptian Cholera Epidemic

Egypt was declared free from cholera on Feb. 11, by which date the danger of infection was considered to have passed.

1. See *Lancet*, 1947, ii, 408.
2. Registrar-General's Statistical Review of England and Wales for the Year 1945. Tables. Part 2. Civil. H.M. Stationery Office. 1948. Pp. 138. 2*s*. 6*d*.

Notes and News

LONDON'S FIRST PREMATURE BABIES UNIT

A PREMATURE babies unit, the first in London, was opened at Hammersmith Hospital on Feb. 12 by Lady Nathan, chairman of London County Council. Primarily, this unit, with accommodation for 20 babies and 6 mothers, is for research; and initially it will serve only nearby districts. Prof. Alan Moncrieff, who is in charge of the unit, at the opening ceremony gave the principal considerations in the care of premature infants as: (1) the prevention of infection; (2) the provision of suitable environment, with particular attention to temperature and humidity; and (3) proper feeding. "Nursing," he added, "is 95% of the battle." Dr. D. de la C. MacCarthy explained that the first aim of the unit was to establish stereotyped conditions in the handling of premature infants; these conditions could then be modified and the effects observed. Furthermore, from the unit cases could be followed up.

THE OLD

OLD people of Holborn were recently given the opportunity of meeting and offering suggestions to the old people's welfare committee of their borough.[1] Some 50 attended, and their proposals show that recent movements to improve the welfare of the old have been on the right lines. One appealed for more visiting in the home, another for a meals centre to supplement their diet. A woman over 60 appealed for restoration of the extra quarter-pound of tea which these young pensioners lost last summer, for the halving of the cost of a wireless licence for pensioners over 65, for cheaper coal for the old, and for some way of sparing them from queueing. On a request for better provision for the care of old people's feet, Mr. R. CLEMENTS, general secretary of the London Council of Social Service, stated that the British Red Cross Society provides a free service for foot troubles at 38, Museum Street, Holborn.

This is an example of the many provisions made for old people that go unclaimed because the potential recipients know nothing about them, while the local authorities and voluntary bodies know only those which come within their own orbits. That was the experience of the Merseyside Survey[2]; and at the second national conference on the care of old people, held last November, a report[3] of which has just appeared, the same weakness of our social services was touched on.

Mr. ANEURIN BEVAN, the Minister of Health, in his opening address, noted that 95% of old people live in their own homes or in the homes of their families, and that a great deal of unhappiness results from this. The association of the young and the old should always be voluntary—one of the many benefits to be achieved by better housing.

Dr. GREIG ANDERSON divided old people into four groups: (1) the elderly, relatively healthy, able to live in their own homes; (2) the elderly and infirm, incapable of running their own homes; (3) the elderly sick, subdivided into the acute sick, the long-term remediable sick, and the group now considered irremediable; and (4) elderly psychiatric patients, divided into those who can be looked after at home and those who need mental-hospital care. For the relatively infirm the hostel is the best solution, the residents paying their own way out of their pensions. What can be done for the long-term sick, he said, has been demonstrated at the West Middlesex Hospital and elsewhere.[4] He emphasised the need for absolutely free passage between the patient's own home, the hostels for the infirm, the general hospitals, the long-term hospitals, and any special accommodation provided for those who were deteriorating mentally.

Sir GEORGE WILKINSON, chairman of the National Corporation for the Care of Old People, noted that though the endowment of the corporation sounds large, it is insignificant when compared with the need. It is already necessary to choose carefully among schemes requesting help; and he urged that schemes should be sound, based on need, and reasonably economical.

Alderman F. MESSER, M.P., talking of coöperation between voluntary and statutory bodies, agreed that it had been

1. *Times*, Jan. 30.
2. Old People's Welfare on Merseyside. ELLINOR I. BLACK and DORIS B. READ. Liverpool: University Press. 1947. Pp. 110. 2*s*. 6*d*.
3. Working Together for Old People's Welfare. Published for the National Old People's Welfare Committee by the National Council of Social Service, 26, Bedford Square, London, W.C.1. Pp. 48. 2*s*.
4. See series on the Care of the Aged. *Lancet*, 1947, i, 760.

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necessary to refuse some applications because it seemed uncertain that organisation was efficient. This led to some discussion turning on the meaning of the word "efficient": for all agreed that schemes should be well run, but nobody favoured the scoured impersonal quality which this word has somehow acquired.

The year's advances in the care of the old were reviewed. Miss OLIVE MATTHEWS mentioned the short-stay hostels now being opened in some areas, where old people can go for a week or two while the daughter, niece, or companion who normally looks after them can take a holiday. Mr. JOHN MOSS, deputy chairman of the National Old People's Welfare Committee, noted that the Salvation Army, one of the pioneers in the establishment of homes for old people, had opened 5 new homes in the year, and the Church Army had completed 2 and had 2 more in preparation. Local old people's welfare committees opened 9 homes, the Women's Voluntary Service 8, the Methodists 3, the National Union of Teachers 2, and the Soroptomists, Rotary Clubs, and Free Churches were opening homes for old people every month. The Church Army Housing Society has opened 11 houses in flatlets and is adapting 17 more. Clubs have multiplied—some being open all day and supplying a midday meal, others opening on two or three evenings a week. The Meals on Wheels service is growing, though more slowly. He appealed for more home visiting.

The conference clearly served an important purpose in bringing together representatives of voluntary bodies and local authorities, who were present in almost equal numbers. It is as important for the two groups to work together in this as in every other field of social service.

MEMORANDA ON BLOOD-TRANSFUSION

IN 1946 the Scottish National Blood Transfusion Association issued two pamphlets—one on "Blood Transfusion Technique and Transfusion Accidents and Deaths," and the other on "The Importance of Rh Factor in Medicine." The demand for these has been keen, and a second edition of each has now been issued. Copies are obtainable from the headquarters of the association at 10, Duke Street, Edinburgh, 1, or from any of the Scottish regional directors.

W.H.O. BULLETIN

THE *Bulletin of the World Health Organisation*, of which the first issue has lately appeared, is designed to reflect all the scientific activities of the Organisation. It is to contain communications submitted by representatives at sessions of the World Health Assembly and of the Executive Council; official reports from the expert committees; and original articles by experts and specialists attached to the Organisation. Among the subjects touched on in the first number are biological standardisation, malaria, immunity reaction following vaccination against smallpox, and post-vaccinal encephalitis. The annual subscription is 30*s.*, while individual issues may be obtained for 7*s.* 6*d.* In the United Kingdom orders for this and other publications of the World Health Organisation may be addressed to H.M. Stationery Office, P.O. Box no. 569, London, S.E.21.

GREAT AUSTRALASIANS

AUSTRALIA and New Zealand have made splendid contributions to anatomy and surgery. In the Syme oration [1] last year Sir Gordon Gordon-Taylor reviewed the work of great Australasians in these fields, from the days when John White, the early surgeon-general, sent bones of strange animals back to John Hunter in England, to modern times; and he also mentioned some Englishmen whose interest in natural history brought them into touch with those who were studying Australasian fauna on the spot. The names are legion, and include Richard Owen, the naturalist, and his missionary correspondent, the Rev. W. Colenso; George Bennett, who gave his name to the tree kangaroo, and rediscovered the pearly nautilus first described by Aristotle; William Lodewyk Crowther, F.R.C.S., who became Premier of Tasmania; Archibald Watson, whose passion for tissue planes showed the way to bloodless surgery; Sir Grafton Elliot Smith, F.R.S., who learned and taught so much about brain structure; and many others, living and dead. He ended with a tribute to the courage of Australasians in war, and their hospitality in peace, and to the "never-failing liberality of Australian and New Zealander through the arches of the years, the gifts of men and material, the genius of thought, the sword of the spirit."

1. The Debt of Surgical Science to Australasia. *Aust. N.Z. J. Surg.* 1947, **17**, 75.

TUTTI FRATELLI

AN acquisitive business instinct brought a young man from Geneva, J. Henry Dunant, to seek an interview with Napoleon III during his campaign for the liberation of Northern Italy in 1859. The young Swiss, in his travelling carriage and cool white suit, arrived near Solferino on a sweltering June day and found a great battle in progress, a battle which lasted for fifteen hours, extended over a front of fifteen miles, and resulted in over 40,000 casualties. After the battle the preparations for the care of the wounded proved woefully inadequate, and Dunant, in an access of horror and energy, did what he could to assist and to organise a relief service for the wounded in hospitals hurriedly improvised in the churches and other buildings of a number of small Italian towns.

The memory of this horror was still vividly present in his mind when, three years later, he published his little book *Souvenir de Solferino*, now reprinted by the British Red Cross Society.[1] The ghastly sights of wounded and dying men lying in overcrowded buildings, thirsty, filthy, with their wounds suppurating, gangrenous, and stinking, with no-one to move them to comfort, and no comfort to which to move them, inspired Dunant to write this poignant appeal for a new method and a new approach. He pleaded for an international relief society, formed in time of peace and quiet, with committees in each country of men enjoying "the most honourable reputation and the highest esteem" whose work, in time of war, would consist of "bringing aid and relief on to the battlefield whenever battle is joined, and subsequently to continue to care for the wounded in the hospitals until their convalescence was complete."

Dunant insisted that the relief work of this organisation should be carried out by voluntary effort, for, he said, "spontaneous devotion of this kind is more easily found than one is inclined to think. There are plenty of people who, once they were sure they could be useful and convinced that they could do real good . . . would certainly be prepared to go, even at their own expense, and undertake for a limited time such an eminently philanthropic task." He continued "for work of this kind, paid help is not what is wanted. Only too often hospital orderlies working for hire grow harsh, or give up their work in disgust, or become tired and lazy." He goes on to emphasise, in words which are as true today as they were when he wrote them, the value in times of emergency of the work of "volunteer orderlies and volunteer nurses, zealous, trained and experienced."

The effect of Dunant's book and of his energetic preaching was remarkable. Solferino was fought in 1859; the *Souvenir* appeared in 1862, and in 1864 the first International Red Cross Convention was signed by fifteen European Powers.

1. A Memory of Solferino. By J. HENRY DUNANT, with an introduction by Major-General Sir John Kennedy. London: Cassell, for British Red Cross Society. 1947. Pp. 64. 6*s.*

University of Cambridge

Air Vice-Marshal A. F. Rook has been appointed senior health officer and Dr. L. H. H. May junior health officer in the department of medicine.

Royal College of Surgeons of England

At a meeting of the council held on Feb. 12, with Sir Alfred Webb-Johnson, the president, in the chair, a proposal to provide residential accommodation for postgraduate students of the college was approved in principle. It was also decided to establish a faculty of anæsthetics in the college.

The Hallett prize was awarded to D. S. Chapman (University of Durham).

The following were elected fellows in dental surgery:

J. B. Parfitt, G. F. Cale Matthews, B. Maxwell Stephens, E. Houghton, J. Bell Milne, Admiral E. E. Fletcher, H. Davis, G. B. Pritchard, G. F. Fawn, P. G. Capon, J. K. Crawford, A. L. Packham, Air-Commodore L. Somerville-Woodiwis, J. A. Snarey Wright, J. James, Prof. H. R. B. Fenn, G. T. Hankey, L. Russell Marsh, G. G. T. Tregarthen, Prof. W. E. Herbert, Prof. M. A. Rushton, H. L. Hardwick, Prof. E. Matthews, G. E. M. Hallett, Prof. R. W. Lovel, A. E. W. Miles, Prof. J. Osborne, Prof. J. Boyes, J. K. Holt, Prof. A. I. Darling.

Diplomas of membership and postgraduate diplomas were granted to the candidates named in our issue of Feb. 7 (p. 236). The D.T.M. & H. was also granted, jointly with the Royal College of Physicians, to M. S. Holman and the D.C.H. to H. S. de Silva.

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University College Hospital

Prof. G. R. Cameron, F.R.S., will deliver a Sydney Ringer lecture at the medical school, University Street, Gower Street, London, W.C.1, on Tuesday, March 16, at 4.30 P.M. He is to speak on Pulmonary Œdema.

Atomic Scientists Association

On Friday, March 5, at 7 P.M., at the lecture hall of the Royal Society of Arts, John Adam Street, London, W.C.2, Mr. W. J. Arrol, PH.D., will give a lecture on Medical and Biological Applications of Atomic Energy. Tickets may be had in advance from Mr. L. E. C. Hughes, PH.D., 15, Avenue House, Allitsen Road, N.W.8.

Ethics and Science Conference

This conference, which was to be held on Dec. 4 of last year, will now take place on Friday, March 19, at the Livingstone Hall, Tothill Street, London, S.W.1. The main theme will be Society and the Individual, and the speakers will include Mr. Kenneth Walker and Dr. E. H. Larkin. Dr. E. B. Strauss will take the chair at the evening session. Further information may be had from the British Social Hygiene Council, Dept. M.2, Tavistock House North, Tavistock Square, W.C.1.

In Memory of Sir Francis Champneys

A service will be held at the Priory Church of St. Bartholomew the Great, Smithfield, London, on March 25, at 11.30 A.M., commemorating the centenary of the birth of the late Sir Francis Champneys, vice-patron of the Royal College of Obstetricians and Gynæcologists and chairman of the Central Midwives Board from its inception in 1902 until his death in 1930. Admission will be by ticket, and inquiries should be addressed to the Clerk to the Governors, St. Bartholomew's Hospital, E.C.4.

Regional Board Appointments

The following appointments have lately been announced:

North-Eastern (Scotland).—Dr. J. C. Knox (medical superintendent, Aberdeen Royal Infirmary) administrative medical officer.

Northern (Scotland).—Dr. A. M. Fraser (M.O.H. for Inverness-shire) administrative medical officer.

South-Eastern (Scotland).—Dr. H. A. Raeburn (a principal regional medical officer of the Ministry of Health) senior administrative medical officer; Mr. Ewen Campbell (late Sudan government) secretary.

Newcastle.—Dr. Theodore Hurley (deputy medical superintendent, Knowle Mental Hospital) regional psychiatrist; Dr. Clement Muir (assistant M.O. for Surrey) assistant senior administrative medical officer.

Hunterian Society

Owing to inability this year to celebrate the birthday of John Hunter by the customary dinner, the Hunterian Society held a reception on Feb. 12 in order that the occasion should not pass unmarked. Among the guests were the Lord Mayor of London and the Lady Mayoress. They were received by Mr. A. E. Roche, F.R.C.S., the president, who proposed the traditional toast of John Hunter. A selection of books, MSS., and relics was on exhibition, including first editions of John and William Hunter's works, with autograph letters of John Hunter and his associates. Not the least interesting item was the first volume of the minutes, dating from the foundation of the society in 1819. The library is now open to visitors and may be seen at 60, Wimpole Street, W.1, by application to the hon. librarian.

Return to Practice

The Central Medical War Committee announces that Dr. W. E. R. Mons has resumed civilian practice at 118, Harley Street, London, W.1 (Welbeck 1611).

Dr. T. M. Ling, director of Roffey Park Rehabilitation Centre, Horsham, is visiting the Scandinavian countries as the guest of their employers' organisations, to lecture on industrial psychiatry.

CORRIGENDUM: *Smoking in Sanatoria.*—Dr. Lennox Johnston's letter in our last issue contains a reference to "the failure of our profession to prevent and cure *the habit of* smoking tobacco." The words italicised should not have been inserted, since Dr. Johnston regards smoking not as a habit but as an addiction. Its essence, in his opinion, is not the repetitive act of administering the smoke, but intoxication by the constituents of tobacco smoke.

Diary of the Week

FEB. 22 TO 28

Monday, 23rd

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. Geoffrey Evans: Treatment of Hypertension.
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Prof. T. Pomfret Kilner: Cleft Lip and Palate Repair.
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
9 P.M. Dr. Cuthbert Dukes: Clinical Pathology in Relation to Medical Practice. (Second Lettsomian lecture.)
HUNTERIAN SOCIETY
8.30 P.M. (26, Portland Place, W.1.) Dr. W. S. C. Copeman: Rheumatism in the Time of John Hunter. (Hunterian oration.)

Tuesday, 24th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. M. H. Campbell: Paroxysmal Tachycardias.
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. P. H. Hayes: Fractures of the Facial Skeleton.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. W. N. Goldsmith: Anomalies of Pigmentation.

Wednesday, 25th

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. J. N. Barron: Hand Injuries.

Thursday, 26th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. Forest Smith: Rheumatism in Childhood.
ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. J. B. Cuthbert: Hand Deformities—Reparative Surgery.
MEDICO-LEGAL SOCIETY
8.15 P.M. (26, Portland Place, W.1.) Dame Louise McIlroy: The Obstetrician and Gynæcologist as a Witness in the Courts.

Friday, 27th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. D. Evan Bedford: Signs of Mitral Stenosis.
ROYAL COLLEGE OF SURGEONS
5 P.M. Sir Archibald McIndoe: External Genitalia—Treatment of Congenital Deformities.
MEDICAL SOCIETY FOR THE STUDY OF VENEREAL DISEASES
2.30 P.M. (11, Chandos Street, W.1.) Dr. H. S. Holden: Crime in Relation to Sex.
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Dr. Browning Alexander: Acute Pericarditis.

Births, Marriages, and Deaths

BIRTHS

ALCOCK.—On Feb. 11, the wife of Dr. R. J. Alcock—a son.
BLOOM.—On Feb. 8, in London, the wife of Dr. P. M. Bloom—a son.
DEVINE.—On Feb. 9, in London, the wife of Dr. John Devine—a daughter.
DHENIN.—On Jan. 30, in London, the wife of Squadron-Leader G. H. Dhenin, G.M., M.B., R.A.F.—a daughter.
DUNN.—On Feb. 8, at Cheam, the wife of Dr. D. M. Dunn, M.B.E.—a son and a daughter.
EDWARDS.—On Feb. 8, at Sutton, Surrey, the wife of Dr. F. H. Edwards—a son.
FISON.—On Feb. 12, in London, the wife of Dr. Lorimer Fison—a daughter.
HAY.—On Feb. 12, in London, the wife of Dr. H. R. C. Hay—a daughter.
KNOX.—On Feb. 10, at Headington, the wife of Dr. Robert Knox—a daughter.
LEWIS.—On Jan. 28, at West Bromwich, the wife of Dr. J. T. Lewis—a son.
LOVELL.—On Feb. 7, in London, the wife of Dr. R. R. H. Lovell—a son.
MACKENZIE.—On Feb. 8, at Templesheen, the wife of Dr. D. H. Mackenzie—a daughter.
MAXWELL.—On Feb. 4, the wife of Dr. Ian Maxwell—a son.
SIME.—On Jan. 30, the wife of Lieutenant D. A. Sime, R.A.M.C.—a son.
WELLS-COLE.—On Feb. 9, at Lincoln, the wife of Dr. G. H. Wells-Cole—a daughter.

MARRIAGES

LEWIN—LUCAS.—On Feb. 12, at Oxford, Denis Lewin, M.R.C.P., to Silvia Lucas, M.B.
M'NEILLY—ROSS.—On Jan. 21, at Ballymena, James Craig M'Neilly, M.B.E., M.B., to Sarah Elizabeth Ross.
WALTON—BIRD.—On Feb. 14, at Wellingborough, Northants, Alexander Clive Rees Walton, M.D., to Molly Winifred Bird.

DEATHS

ADAMS.—On Feb. 9, at Theberton, Suffolk, Philip Edward Homer Adams, M.A., B.M. Oxfd, D.O., F.R.C.S.
HODSON.—On Feb. 9, Vincent Sutherland Hodson, M.V.O., D.M. Oxfd, F.R.C.P.
NUNN.—On Feb. 11, at Barnet, John Wilfred Nunn, M.R.C.S., aged 72.
POOLE.—On Feb. 7, John Copeland Poole, M.R.C.S., aged 78.
RIDDOCH.—On Jan. 30, George Keith Riddoch, M.A., M.B. Camb., F.R.C.S.E., aged 30.
WYNN-WILLIAMS.—On Feb. 6, at Middlesbrough, William Wynn-Williams, M.R.C.S.

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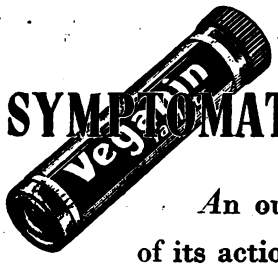

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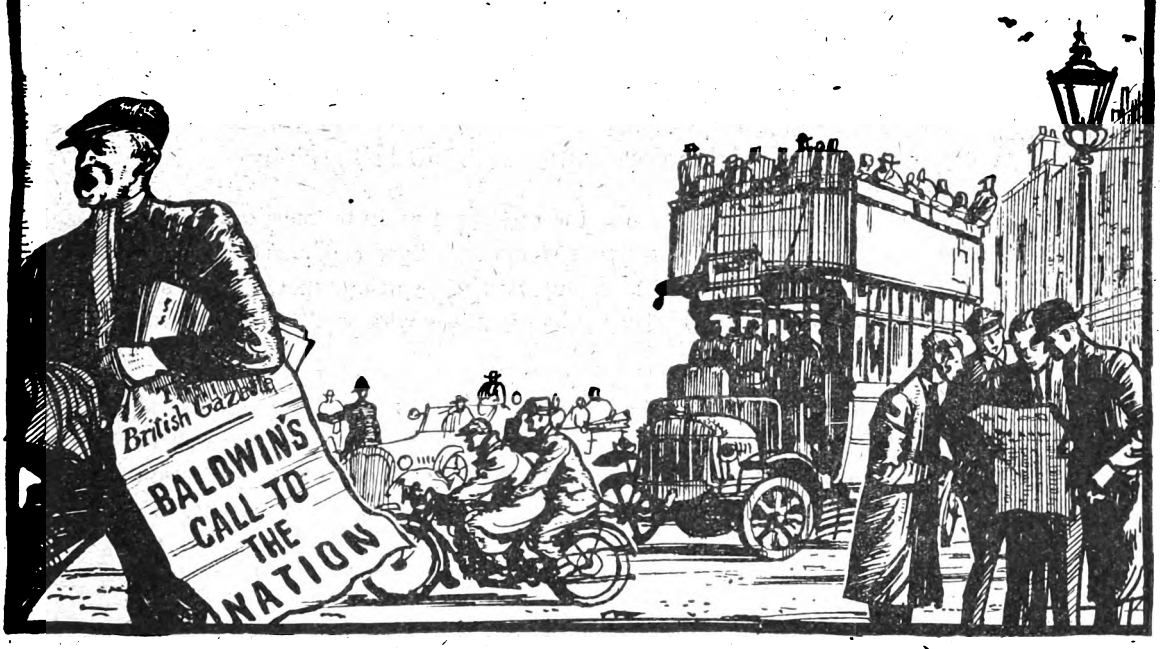

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TUBERCULOUS CERVICAL ADENITIS *

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THERE have always been cases, especially in children, in which the cervical adenopathy subsides, sometimes so rapidly that one wonders whether the infection was really tuberculous. Such cases serve not only to inflate the list of cures by any method of treatment that invokes the aid of the great healer Time but also to bolster the exhibition of problematical and fantastic remedies.

Edward the Confessor (1042–66) introduced the "king's touch" from France, where it was believed that the digital contact of an anointed monarch brought about resolution of the inflammatory mass. With succeeding kings of England this method of treatment became increasingly popular. Charles II (1660–85) touched on an average 10,000 sufferers a year. In addition, he presented each with half a sovereign; possibly the latter adjuvant added to the popularity of the vogue. The "king's touch" held the therapeutic field for more than 600 years. It was given up in 1714 with the death of Queen Anne.

From France too came a real medical advance. Lugol's laborious life-time researches on scrofula are now forgotten, but his solution, the administration of which was one item only of his plan of treatment, keeps his memory alive. Lugol fully recognised the value of fresh air and bathing in the treatment of this condition.

Therapeutic pendulums are for ever swinging. Sometimes they swing too far and become unhitched. The treatment of chronic peptic ulcer swung from medical to surgical treatment, back to medicine, and once more to surgery. The treatment of thyrotoxicosis has likewise oscillated; indeed, it is only this year that the thyrotoxic pendulum has returned from a brief sojourn in a thiouracilic stratosphere.

RISE OF SURGICAL TREATMENT

Curiously, it was a physician, the eminent British physician Sir Clifford Allbutt, who conceived the idea of radical removal of tuberculous cervical lymph-nodes. Aided by his able Leeds surgical colleague, Pridgin Teale, in 1882 he sent the pendulum of treatment of tuberculous cervical adenitis (fig. 1) on its meteoric swing towards surgery (Allbutt and Teale 1885). Sir Clifford's idea, which appears to have been original, was to extirpate all the cervical nodes—a unilateral block dissection of the neck. Contemporary surgical papers illustrate flaps and incisions similar to those used today for the eradication of secondary malignant deposits. By 1900 these dissections had come to occupy an important place in the operating lists of this and other countries, for the results obtained by master surgeon-anatomists were immeasurably better than those obtained by any mode of treatment up to that time. This was an era when specialist surgeons were comparatively few, and they graduated to the operating-theatre by long years of dissecting and teaching in the anatomical department. A block dissection of the neck was just the type of operation at which they excelled.

FALL OF SURGICAL TREATMENT

Dissections of the neck, particularly extensive block dissections, are time-consuming and tedious. As Koenig stated, the surgeon must have iron patience and plenty of time. Plenty of time, at any rate, was not possessed by the surgeon-in-charge of a large service, especially when the surgery of the abdomen was assuming such great importance. Consequently cases of cervical adenitis became relegated to the end of the operation list for the junior man to undertake. Indeed, the operation of removal of tuberculous lymph-nodes came to be looked on as an operation that almost anyone could undertake safely, for the operative mortality was very low.

About this time the surgeon's training was undergoing a metamorphosis. No more was long and close connexion with the dissecting-room the be-all and end-all of surgical apprenticeship. Unquestionably, the rising generation of surgeons, with their greater clinical, physiological, and pathological training, were better equipped for abdominal and other newer branches of surgery than were the passing generation. The relative lack of familiarity with the anatomy of the neck, combined with the inexperience of many of those undertaking cervical surgery, led to frequent nerve lesions, discharging sinuses, ugly scars, and many recurrences. This was one factor accounting for a change in the direction of the pendulum's swing. The other—a far mightier momentum—culminated in a catastrophic counterswing against the use of the scalpel. During the first decade of the present century, Rollier, Sir Henry Gauvain, and others established beyond doubt that exposure of the surface of the body to the rays of the sun, combined with suitable skeletal traction to tuberculous joints, led not only to arrest of bone necrosis but also to regeneration of bone, cure of the disease, and often full restoration of function. As a result of this great advance in knowledge the operative treatment of "surgical tuberculosis" perished.

It is, in my view, unfortunate that tuberculous cervical adenitis, particularly those cases where the lesion was localised, were lumped in with bones and joints under the general heading of "surgical tuberculosis." As I hope to show, sufferers from a curable localised lesion have been denied the advantages of quick rehabilitation afforded by a well-performed operation, and fully 90% have never had, nor are they likely to have in our day and generation, the benefits of institutional natural heliotherapy, which is the quintessence of the therapeutic measures that banished the scalpel.

The world's solariums and open-air hospitals had a few vacancies for cases of tuberculous cervical adenitis, and good results were found to accrue after months, sometimes years, of heliotherapeutic institutional treatment.

Even in those halcyon days there was insufficient room in these special hospitals to accommodate even a small proportion of the patients under consideration. In spite of being cognisant of this fact, those responsible for the treatment of tuberculosis followed Sir Robert Philip in condemning all operative interference.

The term "operative interference," introduced by bygone physicians as a substitute for the more dignified and accurate nomenclature "operative intervention," suggests something of the nature of criminal assault; indeed, it is no exaggeration to say that in a few instances prejudice ran so high that this was the impression that was intended, for I have suffered from it.

Sir Robert besought that surgeons should be constrained to hold their hands. Lesser lights in tuberculosis circles went further and, after gathering a small series of cases that had been referred to the local hospital for operative treatment, denounced all operations for this condition as a barbarous practice. Incidentally several of these investigators had omitted to ascertain who had performed the operations, or what operation had been performed, before reaching this conclusion. As a result of these outpourings the operative treatment of tuberculous cervical adenitis became taboo; any bloodless method was preferred. Since most sufferers from localised tuberculous lesions in the neck could not obtain admission to heliotherapeutic institutions, some substitute for natural sunlight with bed occupation had to be found. This gave tremendous impetus to exponents

* Part of the opening of a discussion at the annual meeting of the Tuberculosis Association on Nov. 14, 1947.

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of tuberculin, X-ray treatment, radium, and artificial sunlight lamps. Added to this, the outpatient surgeon was pleased to be able to transfer these numerous rather uninteresting cases to another department where there was at least a fair prospect of relief, without the occupation of a surgical bed.

So came about the fall of surgical treatment—and great was the fall thereof.

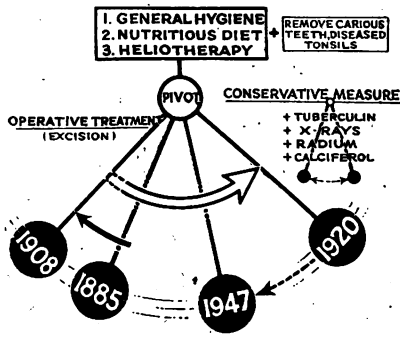

Fig. 1—Swinging pendulum of fashions in treatment of tuberculous cervical adenitis.

PERSONAL OBSERVATIONS

It was when the pendulum had swung away from surgery to its uttermost that I stepped upon the academic surgical stage—certainly only as a super in the extreme back row of a chorus which was chanting melodiously to an audience of medical students "Calot's oblique aspiration of tuberculous cervical abscess" and echoing the principal boy who yodelled "Transfer them to the X-ray department." The great teaching centres of London, Liverpool, Birmingham, and Bristol, with which I was concurrently associated, could be taken as typical of the world's medical schools. I never saw the surgical chiefs operate on the neck for tuberculous lymph-nodes. At this very time Dowd (1905, 1908, 1916), of New York, and Sutcliffe (1903), of the Royal Sea-Bathing Hospital, Margate, were obtaining superb results and quick rehabilitation by modifying the older block dissections to thorough local extirpations through incisions following the creases of the neck, and combining surgery with practical general treatment, but their work received little or no attention.

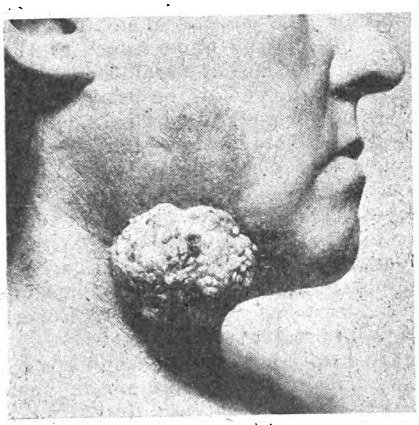

Fig. 2—Squamous-celled carcinoma developing after prolonged X-ray treatment of tuberculous cervical lymph-nodes in a woman aged 31.

During the past twenty years of my interest in these cases I have watched the army of X-ray and radium enthusiasts dwindle to a corporal's guard. Even if it were efficacious in a high percentage of cases, X-ray treatment is not without serious disadvantages. It converts the skin into leather and produces underlying fibrosis. Occasionally X-ray burns are encountered. On rare occasions malignant disease follows irradiation (fig. 2).

PORTALS BY WHICH THE TUBERCLE BACILLUS ENTERS

Tonsils, adenoids, and carious teeth are undoubtedly the main portals by which tubercle bacilli enter the cervical lymphatic system.

Tonsils.—That the infection most often occurs via the tonsils is undeniable. Overwhelming clinical support is afforded by the frequency (54%) with which upper jugular lymph-nodes are attacked. If tubercle bacilli are brushed upon the fauces of healthy animals, tuberculous cervical adenitis can be produced, more easily in animals where the tonsil is relatively large, such as the pig, than in those where it is rudimentary, notably the guineapig. In swine the disease, when localised, is usually situated in the lymph-nodes near the angle of the jaw. The term scrofula comes from the fact that swine (fig. 3) are subject to a like affliction.

Adenoids.—That adenoids are probably a portal of importance second only to the tonsils has not received the attention it deserves. In 22% of cases the posterior triangle is primarily involved, and a high percentage of the victims are young children. It is unlikely that the tubercle bacillus gains entrance from the scalp, which is rightly looked on as the main portal to these nodes. Since some of the lymphatic vessels from the adenoid area pass directly to lymph-nodes of the posterior triangle (fig. 4), there is everything to be gained by assuming that airborne infection reaches the nodes of the posterior triangle through this often diseased filter.

Carious Teeth.—After the posterior triangle, the submaxillary lymph-nodes are the next most often diseased (12%). Here the portal of entry is almost certainly carious teeth. Tubercle bacilli have been demonstrated in decayed root-pulp of extracted teeth (Moorhead 1912).

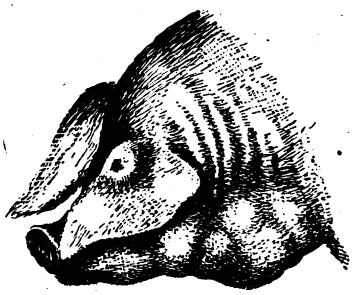

Fig. 3—Sow with cervical adenitis. Positive intradermal tuberculin test of left ear (after Moussu).

The moral is that, whatever treatment is adopted, diseased tonsils and adenoids should be removed and necessary dental treatment undertaken. Experience has taught me that, if the removal of tonsils is undertaken before the operation on the lymph-nodes, the latter is almost always more difficult because of secondary infection by pyogenic organisms. Further, the stage of collar-stud abscess and sinus formation is more rapidly reached.

NATURE AS A SURGEON

This affliction progresses through four local stages which, like Hogarth's rake, pass from bad to worse.

Stage 1.—When a tuberculous lymph-node (or a confluent group of lymph-nodes) breaks down and liquefies, tuberculous "pus" is at first limited by the fibrous envelope of the nodes.

Stage 2.—In many cases, in due course, the envelope bursts and the pus comes to occupy that confined space limited by the deep cervical fascia. Stage 2 is often missed without the clinician even suspecting it. In this connexion I wish to draw attention to a physical sign that I have found reliable when applied to a strictly limited group of enlarged lymph-nodes of the upper jugular chain. It is in this situation that the arrival of stage 2 most often escapes notice, and it is here too where knowledge of its presence is most desirable. If, when the neck is viewed in a good light in several positions, the swelling can be seen as well as felt, stage 2 has been reached.

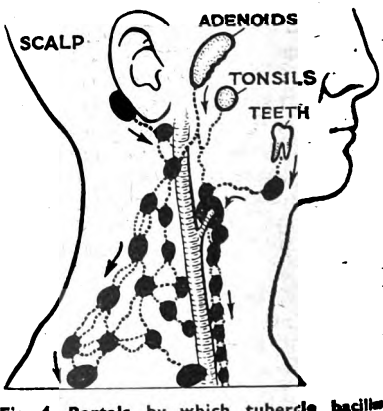

Fig. 4—Portals by which tubercle bacilli enters lymphatics of neck.

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Stage 3.—After weeks or months the dense deep cervical fascial sheath becomes eroded at one small point, and the imprisoned pus, joyous as it were to escape from such a confined space, wells into that commodious compartment beneath the yielding superficial fascia. Thus, sometimes overnight, is reached the well-known stage of what the French so graphically described as *bouton de col*—collar-stud abscess (fig. 5). Insufficient attention has been directed to the clinical entity that I have termed "long-stemmed collar-stud abscess" (fig. 6). In about 25% of cases the superficial abscess does not overlie the breaking-down lymph-nodes that feed it. Indeed, the factory and the store-house may be as much as 6–8 in. apart. Because of the length of the stem of the stud, Nature finds it extremely difficult to perform her bloodless operation of extruding the necrotic material.

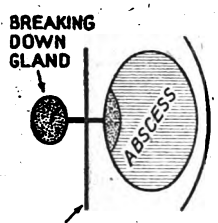


Fig. 5—Collar-stud abscess.

Stage 4.—Still left to Nature, the superficial abscess steadily enlarges until the skin over its centre becomes inflamed. The abscess bursts and the resulting sinus continues to discharge until, in favourable circumstances, the last of the necrotic material beneath the deep cervical fascia is expelled. "Verily is Nature a slow and bad operator," I inwardly remarked when I was shown a partially calcified caseating remnant of a tuberculous cervical lymph-node that had just been extruded from a sinus after many months of conservative treatment at the most renowned solarium in the world.

Fig. 6—Long-stemmed collar-stud abscess.

Contrary to what is sometimes stated, the scars left by Nature's operation are not always so good as those that result from the use of a scalpel.

HINDERING NATURE

Aspiration

My cup of joy would be full if I could persuade those in charge of these cases to give up entirely aspiration of tuberculous cervical abscesses. I am well aware of Calot's oblique technique, and I have given it an extended trial. My conclusions are based on hundreds of cases performed by as many operators in several widely separated parts of the country. I do not refer to the excellent though often depressingly slow results that commonly accrue from adopting this method when the patient is under constant supervision, as would be the case in a heliotherapeutic hospital. My call is directed to all those who have not at their disposal an institutional bed immediately available (and free for several months) for every case of collar-stud abscess.

The leading causes of the high proportion of bad results following aspiration carried out on outpatients are:

(1) The abscess cavity refills more quickly than was anticipated, and either the patient does not report the fact or a locum tenens inserts a hollow needle into the centre of the swelling.

(2) The greater part of the abscess cavity is filled with material not sufficiently liquefied to pass through the hollow needle.

At all events the very thing that has been the clinician's desire to avoid is present—i.e., a patch of skin over the centre of the swelling, sodden, reddened, and threatening to break down. What chance of success is there in the average outpatient? During the past eight years 300 cases have been referred to me where this form of treatment had not prevented skin involvement or sinus formation.

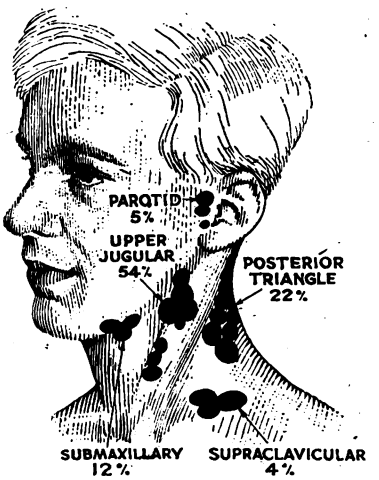
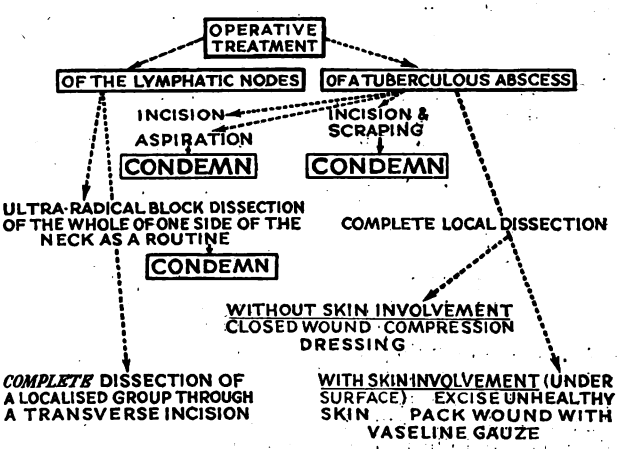


Fig. 7—Various groups of cervical lymph-nodes affected by tuberculosis, founded on 372 consecutive cases. The 3% not labelled are divided between mid-jugular group shown and submental group not shown.

Curettage

For more than sixty years tuberculous cervical adenopathy has been hitched to a bone-and-joint bandwaggon. It is ironical, as well as unfortunate, that passengers in the trailer, who in latter years have been riding so roughly, should continue to be accorded what is most obviously a prerogative of the Pullman-berthed waggon passengers. Volkmann designed his spoon for scraping away necrotic pieces of bone. As Atkinson (1936) says, to scrape blindly down a fistula in the neck is not only inefficient surgery but also dangerous. No doubt, as a result of the trauma and secondary infection, scraping produces cement-like induration of the tissues—induration far greater than that produced by X-ray therapy; induration that sometimes dismays even a seasoned dissector. Curettage is not divorced from the disaster of disseminating tuberculosis. My immediate medical colleagues can quote several examples where death from disseminated tuberculosis quickly followed this procedure in patients who previously had no signs of tuberculosis except a localised lesion in the neck. To scrape soft tissues, particularly those like the neck where the vascular supply is abundant, is the antithesis of the highest attainment of surgery, which is to aid Nature.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COMPLETE DISSECTION OF A LOCALISED GROUP THROUGH A TRANSVERSE INCISION
WITH SKIN INVOLVEMENT (UNDER SURFACE) EXCISE UNHEALTHY SKIN PACK WOUND WITH VASELINE GAUZE
Fig. 8—Scheme of general principles of operative treatment of tuberculous cervical adenitis.

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It is my fervent hope that this procedure will be abandoned, and most tuberculosis officers with whom I work associate themselves with this plea.

AIDING NATURE

The *British Medical Journal* (1871) obtained from several hospital surgeons their opinions about the treatment of tuberculous cervical abscesses. Most were in favour of early incision, using a puncture with a tenotomy knife. Treves (1882) advocated cautery puncture. In my opinion his advice was good. When presented with a patient with a collar-stud abscess for whom admission to hospital cannot be obtained within a week, I suggest that tuberculosis officers and others should empty the abscess as follows:

Infiltrate the skin over the centre of the swelling with a drop or two of local anæsthetic. Having heated a large aspirating needle to bright red heat, plunge it through the skin. Evacuate the pus by firm expression. Place a sterile pad of gauze on the area of the puncture. Over this apply a 'Viscopaste' bandage firmly, so as to splint the neck. The patient should be instructed to attend weekly for reapplication of the dressing until he or she has obtained suitable hospital accommodation.

If this method is used, multiple sinuses and extensive areas of skin involvement, which are at present so frequent, would be banished.

PILLARS OF SUCCESSFUL SURGICAL TREATMENT

(1) *A good anæsthetist.*—Under general anæsthesia, particularly when the airway is not free, intravenous pressure rises. Diminutive veins wax proud, main tributaries become formidable vessels, the internal jugular vein and veins of kindred girth billow into mighty bags of blood that collapse suddenly in inspiration, almost at once to rise again and well-nigh burst should the patient cough. That the anæsthetist should be experienced in intratracheal methods, especially in children, is of vital importance.

(2) *The surgeon* should have some special training before undertaking these cases. Since there are very few who have had the necessary training, surgeons used to thyroid surgery and many progressive otorhinolaryngologists are especially adaptable to this work. Any surgeon with a good knowledge of the anatomy of the neck can quickly become adept, provided he has the time and patience to undertake the dissections, which on no account should be relegated to the end of the list for the house-surgeon to carry out.

(3) *Diseased tonsils and adenoids* (especially adenoids) should be removed by an otorhinolaryngologist or a surgeon specially trained in the removal of adenoids.

(4) *Convalescence.*—Provision should be made for adequate convalescence up to two or three months in an institution with a sister especially trained in the correct method of dressing open wounds.

The fair county of Kent, the garden of England, has contributed more to the practical handling of tuberculous cervical adenitis than any county in England or, for that matter, in the world. For more than sixty years the Royal Sea-Bathing Hospital at Margate has given these cases special consideration, and the eminent successive surgeons in charge of this hospital have never ceased to keep the lamp of cervical operative surgery alight for the quick rehabilitation of selected cases. Kent, thanks to the foresight of its chief tuberculosis officer, is the only county in Britain to have provided a convalescent home solely for cases of tuberculous cervical adenitis.

RENAISSANCE OF SURGICAL TREATMENT

Of the 800 lymph-nodes of the body 300 lie in the neck. From the clinical, pathological, and operative surgical standpoints it is desirable to divide these cervical lymph-nodes into various groups that include the parotid group. The last is not a strictly anatomical inclusion. In the heyday of cervical extirpations surgeon-anatomists described and illustrated an operation to eradicate all the groups except the one that naturally they would not, nor indeed could, include in a block dissection of the neck. Regional grouping of the cervical nodes, of incidental importance to the surgeon-anatomist in their radical operation, is the lodestar of that small band of surgeons who continued to operate on these cases during the fall of surgical treatment. Regional grouping (fig. 7) will prove a trusty pivot for the pendulum that was unhitched temporarily.

The operative technique should be varied when the patient comes for treatment with skin involvement (Bailey 1945). The broad outline of what I have evolved from an experience of between 1300 and 1500 operations on patients with tuberculous cervical adenitis is summarised in fig. 8.

In the whole of the surgical literature there is not an adequate description of how to deal with each group of cervical nodes. Obviously, if the submental group is alone affected, operative technique will be vastly different from that for, say, the supraclavicular group, the parotid group, or the retropharyngeal group. The descriptions available concern the upper jugular chain, with a few notes on how to deal with the posterior triangle. These are far the commonest situations of tuberculous lymph-nodes suitable for eradication, but 30% of the cases concern other triangles, and many most suitable cases for surgery, unsuitable for other methods, fall into the latter category.

ENVOI

During and since the late war the number of cases of tuberculous cervical adenitis has increased. While we are awaiting the medical millennium many of you will continue to be confronted with the problem of how best to deal with these patients, and especially with those who are bread-winners or who must be educated and rendered fit for the battle of life with as little delay as possible. For those who find themselves in this predicament, I put forward the case for combined efficient operative treatment and reasonable convalescent after-care.

In conclusion, I cannot do better than quote Dr. Dowd, of New York, whose writings on this subject have been a constant inspiration to me: "If operation gives them the best likelihood of a cure, they should have operation; if operation plus another form of treatment is desirable they should have both. If another form of treatment gives quicker and better results, it should be used; but the patient should not be allowed to drag on from stage 1 to stage 2, 3, or 4 while such treatment is being tried."

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"... In the middle decades of the 19th Century, the cleavage between scientists and practitioners was much greater than in our time. ... Clerk Maxwell's public comments on Alexander Graham Bell's telephone is a case in point. The physicist reviewing the inventor's work left no doubt in the audience's mind who was top dog in any hierarchy that mattered. Even Pasteur could be regarded by his contemporaries as a promising young chemist gone astray. Like Humphry Davy before him, he was working for the doctors; but, unlike Davy, he came into this sad occupation not as piece of youthful folly but as a mature man ... The pendulum has now swung very far to the other side—too far, some scientists would say. ... Is there danger that in the present fusion of pure and applied science the tradition of the investigator interested *only* in the conceptual schemes will be so weakened as to disappear? I am inclined to think so."—JAMES B. CONANT, *Science*, Jan. 23, p. 77.

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THE ESSENTIAL PATHOLOGY OF KWASHIORKOR

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THE nutritional disorder widespread in Africa and variously named kwashiorkor (Williams 1933, 1935), infantile pellagra (Trowell 1937), and malignant malnutrition (Trowell 1944) has attracted considerable interest since the discovery of the rôle of specific factors in the prevention of liver disease induced by dietary deficiencies (Witts 1947). But, apart from a short description of the liver in this condition by Smith (1943) and the work of Gillman and Gillman (1945a and b) in South Africa, little has been written about the pathology, and this has considerably hampered investigations.

Further, as shown below, the condition seen in Johannesburg is rather different from that seen in Uganda; in particular, in Uganda no evidence of any derangement of iron metabolism has been found, iron pigment is never abundant, and the condition never proceeds to hæmochromatosis. Indeed no case of hæmochromatosis has ever been found at necropsy at the Mulago Hospital, Kampala.

Kwashiorkor occurs in both children and adults and in both sexes. Detailed descriptions of the clinical features have been given by Trowell (1940) and Trowell and Muwazi (1945a and b) based on cases seen in this hospital. The main features of the condition are anæmia, œdema, pot-belly, skin depigmentation, and various other skin lesions. The hair is altered in colour and texture, becoming soft, scanty, and straight, and varying from reddish-brown to flaxen or even white. Radiologically a deficiency bowel pattern is found (Brown and Trowell 1944). There are striking alterations in the plasma-proteins and a reversed albumin-globulin ratio. The stools are bulky and soft and contain considerable quantities of undigested food.

This is the picture shown most typically in childhood but also in adults in an acute phase of kwashiorkor. Recovery from this is so slow that it appears likely that internal organs and the internal metabolism are permanently altered. The clinical conception has therefore been widened and has come to include patients in this late phase with but few signs. These people are thin and weak, with straight soft depigmented hair, and their stools contain undigested food. Anæmia and œdema are usually not severe, but at any stage a shortage of food or an acute infection may throw them back into an acute phase.

Both primary and secondary forms of kwashiorkor exist, and any infection, notably tuberculosis, may cause kwashiorkor to arise, even in a previously moderately well-nourished African. This paper deals only with primary kwashiorkor. The only infestations in this series were malaria and ankylostomiasis, except for one patient with a mild amœbiasis and two with ascariasis.

MATERIAL

All the cases were diagnosed as typical kwashiorkor by Dr. H. C. Trowell, and the diagnosis appeared entirely justified by the clinical history and the biopsy and necropsy findings. Liver-biopsy specimens were studied from 24 children and 10 adults. Of these, 7 came to necropsy (4 children, 3 adults). In several cases serial biopsies were studied in connexion with the investigations of the glucose-glycogen conversion (Holmes and Trowell 1948). A further 9 adults and 8 children, on whom no biopsy examinations were performed, were studied at necropsy. They represented thirteen tribes from a wide area of East Africa and Central Africa, but most came from Uganda, whose people are regarded as comparatively well nourished.

The biopsies were carried out by Dr. Trowell, using his own modification of the Gillmans' biopsy apparatus. The liver was approached anteriorly via the xiphisternal notch. The percentage of failures was negligible, and no deaths resulted. The liver threads were expelled into 4% formol alcohol and embedded in paraffin, and serial sections were cut. Frozen sections could not be obtained, since no freezing microtome was available. The sections were stained with hæmatoxylin and eosin, Goldner's (1938) modification of Masson's trichrome stain; reticulum fibres were impregnated with silver by Wilder's (1935) method; and iron pigment was searched for by Gomori's method (1936). In the early stages of the investigation Best's carmine was used to demonstrate glycogen granules; but, as the results were poor and a chemical method for the estimation of glycogen in liver threads was developed (Holmes and Trowell 1948), this method was given up. Necropsy material was fixed in 10% formol saline. Unfortunately no photomicrographic apparatus was available; hence the findings cannot be illustrated.

The results showed that in all these cases a similar process was going on, though at various stages in the disease various histological lesions were found. The same lesions were found both by biopsy and at necropsy, and in no case did the biopsy and necropsy findings differ. The cases are divided into four groups as follows:

Group	*Age (years)*	*Biopsy only*	*Biopsy and necropsy*	*Necropsy only*
I	Under 5	14	2	8
II	5–10	6	1	0
III	10–20	5	1	1
IV	Over 20	2	2	8
	Totals	27	6	17

The smallness of this series is due not to the lack of cases of kwashiorkor but to the necessity of eliminating cases complicated by other diseases.

CHANGES IN THE LIVER

Group I (under 5 years old)

In this group 10 of the children biopsied were Ganda, as were 7 of those who came to necropsy. In fact this group consisted of local residents. The youngest was aged six months, but this child was heavily infected with malaria. There were 3 aged just one year, and 1 of these was free from all parasites. Out of the whole group only 6 were free from both protozoal and helminthic infestation.

The same process was going on in the liver in every case. The earliest lesion appeared to be an accumulation of small fat droplets in the cells at the periphery of the lobule. The droplets distend the cells and compress the sinusoids. If the condition continues, fat appears in the mid-zonal cells and finally in the centrolobular areas till eventually the liver becomes so fatty that no normal liver cell is seen and it becomes almost unrecognisable. There is no sinusoidal dilatation, and no iron pigment is present. Malaria pigment may or may not be present. It is found in the liver cells and in Kupffer's cells, which lie flattened along the compressed sinusoids, and tends to collect in the peripheral part of the lobule lying free in the sinusoids and in the portal areas. After the appearance of the fat, lymphocytes and occasionally eosinophils appear in the portal areas and in the peripheral portions of the sinusoids; the reticulum fibres in the portal areas and surrounding the peripheral liver cells reduplicate, and fibrous tissue is laid down along the lobule periphery and, extending down the sinusoids from the periphery, surrounds and strangles the peripheral liver cells. These cells disappear, and the fibrosis increases and extends still further into the lobules. As a result of this the liver at necropsy is enlarged, firmer than normal, and light yellow, orange, or buff, and the liver threads removed at necropsy have the same colour and are so infiltrated with fat that they tend to float in the fixative.

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Should the condition improve, resolution begins in the centrolobular region round the central vein; the fat droplets become smaller and disappear, and the cytoplasm of the liver cells free of fat becomes firmer and stains more intensely with eosin. The fat retreats from the centre of the lobule through the mid-zonal region to the periphery, and the peripheral fat is the last to disappear. If improvement continues, this disappears too, and finally the liver lobules are left with accumulations of fibrous tissue in the portal areas apparent as a fine patchy monolobular cirrhosis and with accumulations of lymphocytes at various points round the periphery of the lobules. This combination of a patchy monolobular fibrosis with round-cell accumulations is the hallmark of kwashiorkor and persists throughout life.

Vint (1931) recognised this condition as being present in nearly every African liver, and in more than 1000 necropsy specimens I have found it in every case save in a few very young children. Vint attributed this condition to parasitic infestation, but this seems to be erroneous. It causes the striking histological difference between African and European; for, whereas in a European, even in Uganda, the liver shows little evidence of lobulation and one infers that between one central vein and the next there is a sinusoidal watershed, in the African liver, on the other hand, it is always easy to see the lobular outlines drawn in by the fibrous tissue and lymphocytic infiltrations.

The fat distribution is so constant that when, in a case diagnosed as primary kwashiorkor in a child under the age of five years, the usual fibrosis and cell accumulations are seen and the fat is not peripheral but mid-zonal, centrolobular, or in irregular focal areas, some serious complication is to be suspected, and the condition is probably secondary kwashiorkor.

The process has been described as if it could be divided into stages; but, though the fat accumulation is the first to appear, fat-accumulation, round-cell infiltration, and fibrosis go on together. Thus the usual picture found is of moderate periportal and peripheral pericellular fibrosis with strangulation of the peripheral liver cells, lymphocytic collections in the portal areas, and fat in the peripheral cells and extending inwards to a varying depth.

Further, in the above description the changes accompanying improvement are described as the retreat of fat from the centre. Most children who die do so with a fatty liver, but in those who survive there is a gradual disappearance of fat from the liver without any clinical improvement. Thus those children who survive pass into the picture described for groups II and III. This change is not due to increasing age but to the duration of the disease. Adult Africans subject to a malnutritional phase develop the same changes in the liver as do the small children, and a fresh kwashiorkor fibrosis may develop on top of a mild kwashiorkor fibrosis, the legacy of a childhood malnutritional phase.

Group II (aged 5–10 years)

This group contained 2 children between five and six years of age. These showed the same changes as described in group I, save that the fibrosis was more severe. In the remaining 5 children, aged six to ten years, this process had gone further and the condition was very different: 3 of these showed no fat droplets whatsoever in the liver biopsy; and 2 showed only a very slight amount of fat diffused through the lobule without any large droplets in the peripheral region. The fibrosis in all cases was severe, being least in the youngest and becoming more apparent in the older children until in the eldest, aged ten years, it had reached the stage of a well-marked monolobular cirrhosis. Only 1 of these children had a malarial infestation and he had mild amœbiasis also; 4 of the others had mild ankylostomiasis.

The cases in this group are important because they show that the fatty liver so prominent in group I is not the essential lesion in kwashiorkor, and that very severe and typical kwashiorkor can exist without any fat in the liver. They also show that from kwashiorkor there can develop a monolobular cirrhosis. Late cases of this pure monolobular cirrhosis are found at Mulago, but not very often, and present an interesting picture.

The liver is light buff or stone colour, its size is not much different from normal, and it is extremely hard to cut. On section a pure monolobular cirrhosis without lobular collapse or hyperplasia is seen, the liver cells are very fatty, there is little distortion of the lobular architecture, and there is an almost complete absence of bile retention. It has been stated that it has not been seen very often. This seems, so far as present investigations go, to be due to the fact that, in the later stages of the development of kwashiorkor fibrosis, focal or even large-scale necroses are seen with lobular collapse and regenerative hyperplasia, and the smooth monolobular cirrhosis has superimposed upon it a further fibrosis, the final result being a mixed type of cirrhosis. This condition was also recognised by Vint (1931) and for ease of reference is called Vint's cirrhosis. These changes appear to be similar to those described in animals by Himsworth and Glynn (1944), which are referred to for convenience as Himsworth's lesions. None of the cases in this series showed traces of these Himsworth's lesions, save in 2 cases in group II and 1 in group IV, in which small areas of necrosis were found. The lesions again do not seem to be essential lesions in the pathogenesis of kwashiorkor, however much they may complicate the later stages.

Group III (aged 10–20 years)

These showed changes similar to those found in the older group-II children. Fat was either absent (4 cases) or very slight (3 cases). In 1 of the 3 latter cases fat was diffuse throughout the lobule, and in the other 2 there was a slight peripheral accumulation. All showed well-marked fibrosis. In 3 cases there was ankylostomiasis, and 1 of these had malaria also. Only 2 cases came to necropsy.

Thus in these cases also well-marked signs and symptoms of kwashiorkor were not accompanied by fatty livers.

Group IV (over 20 years old)

None of these cases showed evidence of malaria, and only 2 had ankylostomiasis, both being mildly infested. This group could be divided into two subgroups.

Subgroup A consisted chiefly of local residents, and the picture in their livers was similar to that found in groups II and III, there being perilobular and pericellular fibrosis, the fat infiltration being usually negligible.

Subgroup B consisted largely of recent immigrants to Kampala, mostly from Rwanda-Urundi. During their long trek to seek employment in Uganda they often suffer severely from malnutrition and many die en route. The picture found in their livers resembles that of group I: gross fatty infiltration and early fibrosis. The fibrosis is, however, usually more severe than that of group I, probably owing to a recrudescence of a kwashiorkor state in abeyance since childhood.

CHANGES IN THE PANCREAS

The earliest histological changes in the pancreas appear to be atrophy of the acinar cells with a diminution in the numbers of secretory granules. The difficulty of obtaining very fresh necropsy material, particularly in the tropics, makes it difficult to decide if there are islet changes.

The next stage is more definite: the cells undergo hyaline changes; the tubules are dilated; and a peri-acinar, intratubular, and perilobular fibrosis begins. There is also a periductal fibrosis. Iron pigment is not seen. The effect is that the acinar tissue is broken up by the fibrosis, and the lobular outlines are shown up by dense bands of fibrous tissue. In advanced cases the acinar tissue disappears over wide areas of the pancreas; the islets are affected, and some seem to disappear.

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In the early stages it seems as if there are islet hypertrophy and possibly hyperplasia, but it is difficult to be certain about this. The process may stop at any stage, and, governed by unknown factors, may be fast or slow. In a child aged 5½ years the process was very advanced; in a man of 24 the pancreas had been almost completely superseded by fibrous tissue.

Though a small cyst was found in 1 case, in no case has any ductal metaplasia been seen, and the condition does not appear to be related to the Anderson-Farber syndrome.

The late results of the pancreatic fibrosis appear to be as lethal as, and more far-reaching in effect than, the hepatic fibrosis. Both hepatic and pancreatic carcinomas are common at Mulago (Davies 1948); and, on the analogy of the Anderson-Farber syndrome, pancreatic insufficiency may be a factor in the high African death-rate from respiratory infections (Davies 1947). It is also possible that some of the patients dying at Mulago in status epilepticus unrelieved by the usual remedies may have had hyperinsulinæmia.

CHANGES IN THE KIDNEY

The kidneys have been examined in 20 cases; in 11 of them lesions were found corresponding to those first described by Hennessey (1938) and called by him "proliferative glomerulitis." This was well marked even in young children. The most striking feature of the condition is the glomerular hyalinisation. This is extremely common, being found in 176 kidneys out of 353 removed at necropsy. I cannot agree fully with the description of this lesion as given by Hennessey (1938). The proliferative hyperplasia described as taking place in the capsular epithelium appears to me to be a metaplastic change by which the flattened epithelial cells become more cubical, especially at the exit into the first convoluted tubule. Crescent formations do not appear to be an essential feature, and the hyalinisation appears to start at the base of the glomerular tuft rather than in the centre. Pericapsular fibrosis is common. The condition bears a distinct resemblance to the renal lesions accompanying portal cirrhosis as described by Baxter and Ashworth (1946), and what may be an extreme example of the capsular epithelial metaplasia has been reported by Eisen (1946). Rolleston and McNee (1929) point out that pancreatic changes and renal changes are commonly found in patients dying of portal cirrhosis, and that in the late stages of Hanot's cirrhosis a portal cirrhosis supervenes. These remarks are interesting in connexion with the later stages of kwashiorkor fibrosis.

DISCUSSION OF FINDINGS

The evidence so far presented shows that the relationship between the clinical state of kwashiorkor and fatty infiltration of the liver of a characteristic pattern is not constant: acute kwashiorkor, both in children and adults, is associated with fatty infiltration of the liver of a characteristic pattern; but in the later stages of the disease fat may be entirely absent from the liver. It follows that kwashiorkor cannot be due merely to a nutritional deficiency causing fat accumulation, and that this is only epiphenomenal. The cause of this fat-lesion and the essential pathology of kwashiorkor, if such exists, must be looked for elsewhere.

In the early stages of this investigation attention was concentrated on the liver; at the same time interest was aroused by patients presenting as diabetics in hyperglycæmic coma. These were treated in the orthodox way with insulin injections. They passed into hypoglycæmic coma, and from this state they could not be roused, even after large doses of intravenous glucose. At necropsy the pancreas was almost completely fibrosed: little or no acinar tissue could be seen; and the islets were embedded in masses of fibrous tissue. As a result of this finding, sections of the pancreas were removed as a routine at all necropsies, and it soon became apparent that pancreatic fibrosis was extremely common at necropsy, some degree of fibrosis being found in 103 of 165 pancreases examined.

Remembering that fatty infiltration of the liver had been described in depancreatised dogs kept alive with diet and insulin (Witts 1947), we turned our attention to the pancreas in kwashiorkor. Biopsy was, unfortunately, impossible, but at necropsy close attention was paid to the pancreas. Since then, of the 13 patients with kwashiorkor coming to necropsy, every one, however young, has shown severe pancreatic lesions, independently of fatty infiltration of the liver.

It seems therefore reasonable to assume that pancreatic fibrosis is a kwashiorkor lesion, and that its frequent occurrence in Africans is compatible with the known fact that every African goes through a kwashiorkor phase in childhood (Trowell and Muwazi 1945a), as shown by the constant finding of kwashiorkor hepatic fibrosis and cellular infiltrations. Upon this assumption and by correlating the findings both in kwashiorkor and in the general necropsy cases, a coherent account of the changes in the pancreas appeared to be possible.

PRESENT CONCEPTION OF KWASHIORKOR

There is much in the clinical picture of kwashiorkor to suggest that it is initially a pancreatic deficiency disease due to malnutrition. The pot-belly (almost always present in African children), the steatorrhœa, the failure to digest meat and starch, and the fatty infiltration of the liver all point to a primary pancreatic disease. I do not intend to discuss the possible dietetic deficiencies responsible or the possible relation to sprue, cœliac disease, or hæmachromatosis and pellagrous lesions as seen in South Africa; but it does seem possible to put forward a tentative theory and description of kwashiorkor.

For the first few months after birth the breast-fed African child thrives moderately well, though he gets a poor start owing to maternal nutritional deficiencies (Trowell 1946). Next ensues a period of malnutrition, possibly intensified by malaria, which causes pancreatic deficiency, probably biochemical at first, with failure of exocrine secretion and manifested by inability to digest food properly. It is also manifested by fatty infiltration of the liver with fibrosis and round-cell accumulation. In severe cases the liver is grossly fatty; at necropsy this is the most striking lesion and overshadows the more important lesions in the pancreas. But, if the process continues and the patient survives, the body adjusts itself biochemically and the fat disappears from the liver, leaving the fibrosis and the cell accumulations as evidence of its passing. While this goes on the kidney too is being damaged.

What happens after this is as yet uncertain, but it appears that the damage to these organs may continue, separately or together, leading to monolobular hepatic cirrhosis, pancreatic fibrosis, or renal failure from proliferative glomerulitis. Upon the monolobular cirrhosis may supervene a dietetic necrosis; hence the final picture is that of combined monolobular and multilobular cirrhosis.

RESPONSE TO TREATMENT

The response of kwashiorkor to treatment with various specific nutritional factors will be discussed elsewhere. The changes taking place in the liver have been described, and the retreat of fat from the liver cells has been seen under treatment; but this change does not necessarily betoken clinical improvement, since after the initial fatty infiltration the fat will disappear, if the process goes on long enough, without clinical improvement. One

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curious finding may, however, be mentioned: almost the first sign of clinical improvement is a swelling of the parotid and other salivary glands, at first thought to be mumps. In view of the known similarity of the pancreas and the salivary glands, perhaps some such change takes place in the pancreas, since the next manifestation of improvement is an alteration in the stools, which soon contain no undigested food. Enlargement of the parotid glands is common in Uganda, which suggests that it may be linked with dietary deficiencies.

The fact that a fatty liver is not invariable in kwashiorkor, and is only a manifestation of pancreatic inefficiency, suggests that the therapeutic attack should be directed towards the pancreas and preferably before the liver is very fatty; since, when the fat does accumulate, it is because the pancreas is seriously damaged. The next step is clearly to investigate further the pancreatic derangement.

SUMMARY

The clinical features of kwashiorkor are briefly discussed.

The biopsy and necropsy findings suggest that in all cases of primary kwashiorkor the essential pathology is the same.

It is suggested that kwashiorkor is essentially a pancreatic disorder due to malnutrition and possibly intensified by malaria; that in consequence of the pancreatic malfunction the liver becomes infiltrated with fat; but that, if the patient survives, the fat disappears from the liver without clinical improvement.

The late results of kwashiorkor are cirrhosis of the liver, pancreatic cirrhosis, and a form of nephritis.

Mild forms of these conditions are so constantly found at necropsy that almost every African child must go through a kwashiorkor phase.

No attempt has been made to discuss the specific ætiology or to compare it with other conditions.

This work has been carried out at Mulago Hospital in conjunction with Dr. H. C. Trowell and Dr. Eric Holmes. My thanks are due to Makerere College for apparatus and materials and for the technical assistance of Mr. K. D. S. Matovu; and to Prof. H. P. Himsworth, Drs. T. and J. Gillman, and Dr. B. J. P. Becker for their help.

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"... Research-workers tend to present their results as if they were the outcome of systematic and orderly progression. This fosters the tendency to overestimate the importance of planning in scientific research. This same tendency exists in all fields of human activity, and in retrospect each of us is apt to regard his actions and thought processes as rational. We readily deceive ourselves that our convictions are the logical consequence of a continuous and reasonable train of thought."—Dr. N. HOWARD-JONES, *Wien. klin. Wschr.* 1947, 59, 837, 857.

NOSE AND SKIN CARRIAGE OF STAPHYLOCOCCUS AUREUS IN PATIENTS RECEIVING PENICILLIN

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THE introduction of the coagulase test (Cruickshank 1937, Neter 1937) for differentiating staphylococci thought to be potentially pathogenic has stimulated much work designed to elucidate their importance and distribution.

Staph. aureus, the name used here to designate a gram-positive coccus coagulating human plasma, is now firmly established as an organism which, in contrast to other staphylococci, often forms well-defined toxine and enzymes (Chapman et al. 1934, Christie et al. 1946, Cowan 1938, Schwabacher et al. 1945), is highly pathogenic to the rabbit, and is characterised by a specific polysaccharide complex (Cowan 1938, Julianelle and Wieghard 1935). This organism is therefore distinct from the commoner gram-positive cocci which colonise the nose and skin. The frequent isolation of *Staph. aureus* (coagulase-positive staphylococci) in pure culture from many purulent lesions, including osteomyelitis (Fairbrother 1940), is strong evidence of the pathogenicity of this organism to man.

We have at present no satisfactory proof of the converse fact, often implicitly accepted, that all coagulase-positive staphylococci are potential pathogens to man; nor do we know the pathological sequelæ of local multiplication of this organism on broken skin surfaces (Miles 1944, Williams and Miles, in the press). But the case for most strains of *Staph. aureus* being potentially pathogenic is, in our opinion, strong enough to justify further investigation of the distribution and rôle of this organism on the human skin.

The distribution of *Staph. aureus* in healthy people has been studied in detail. Swabbing large and varying samples of the adult population has repeatedly revealed a high incidence of this organism in the nose (McFarlan 1938). Many people carry the organism persistently for many weeks. It is found also on the normal skin, especially on the back of the wrist, in a smaller, but still high, proportion of persons. More "skin-positive" persons show nasal carriage than do "skin-negatives" (Gillespie et al. 1939, Martin 1942, Miles et al. 1944). Typing of the staphylococci isolated from the nose and skin of one person usually shows them to be of common origin (Fisk and Mordvin 1944, Williams 1946). These facts and similar evidence have led to the suggestion that staphylococci found on normal skin are usually derived from the nose, probably by direct contact. We have set out to test this hypothesis by experiment. If this hypothesis is correct, abolition of nasal carriage for a period might be expected to reduce skin carriage.

The technique adopted was the local application of penicillin to the nose of a selected group of hospital patients with normal skins who had been observed long enough to know that they were persistently carrying coagulase-positive staphylococci in the nose. Having made sure that this application was effective in a few patients, we observed the nose and skin carriage-rates of further patients. To demonstrate that the effects discovered on the skin during this therapy could not be

* In receipt of full-time grant from the Medical Research Council while working for their committee to advise on the medical and surgical problems of deafness.

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attributed to absorption of penicillin into the blood-stream (Meads et al. 1945), we present data obtained from patients undergoing systemic treatment.

This work has confirmed the importance of the nose as the source of skin staphylococci in most cases. A further definition of the exact nasal site has also been made by confirming the relative sterility of the mucosa-lined cavities of the nasal fossæ (Thomson and Hewlett 1895).

This study has concentrated on the specific problem of the dependence of skin carriage on nasal carriage in persons with normal skins. The results confirm the advisability of combined nasal and skin treatment in some cases of skin infection, as suggested for sycosis barbæ (Fleming 1946, Burrows et al. 1945) and pemphigus neonatorum (Knott and Blaikley 1944, Williams et al. 1947). The practical applications have not been further explored here.

EXPERIMENT WITH INTRANASAL PENICILLIN

Selection of Patients.—All the results described here are from patients in one male surgical ward, which was visited daily for about eight months during 1946. From May to November intranasal penicillin was given to all available "persistent carriers," a term we apply to patients whose first two nasal swabs yield *Staph. aureus* on the direct plate. The patients so selected comprise about 1 in 5 of all admissions and, in the absence of intranasal penicillin, carry persistently for the ensuing 2 or 3 weeks at least.

Methods of Giving Intranasal Penicillin.—This was the responsibility of the nursing staff. Each patient received a 10-day course of 50,000–100,000 units of penicillin, roughly estimated by measuring every 7 or 10 days the volume or weight of the preparation used. The spray, given to the first 10 patients, was applied thrice daily in a concentration of 12,500 units/ml. from an atomiser, whose removable sterile glass end was placed just inside each nostril. The cream, given to the next 11 patients, was applied twice daily in a concentration of 100,000 units per g. in a 'Lanette wax' base, small sterile swabs being used as applicators.

Bacteriological Technique.—Moistened swabs were taken daily from each patient, one from the two nostrils and one from the skin. The skin swab was omitted from the first 6 patients receiving intranasal penicillin but introduced immediately it was clear that, since the penicillin was reducing *Staph. aureus* nasal carriage, parallel skin results would be of interest. These swabs were taken by thoroughly rubbing an area of about 1 in. in diameter on the back of the wrist (the left unless there was an injury of that arm or hand).

The swabs were inoculated on to horse blood agar plates incubated aerobically, and also into broth tubes incubated anaerobically before subculture (Williams and Miles 1945). All gram-positive cocci coagulating human plasma (Williams and Harper 1946) were termed "*Staph. aureus*." Enough penicillinase (Harper 1943) was added to the broth for small test inocula of *Staph. aureus* to multiply in 24 hours in spite of being mixed with 100 units/ml. of penicillin at the time of inoculation. Similarly, enough penicillinase was added to the solid media to neutralise 30 units/ml. of penicillin.

These concentrations appeared adequate in that patients receiving intranasal penicillin continued to yield *Staph. aureus* at least during the first day or so of treatment. To check this point, we examined specially one or two nasal swabs from patients whose noses had ceased to yield *Staph. aureus*, but who were still receiving intranasal penicillin. These swabs, thoroughly rubbed up in the routine penicillinase broth, did not yield enough penicillin to inhibit the growth of a small inoculum (about 500 viable organisms) of sensitive staphylococci.

A single *Staph. aureus* colony from each positive swab was tested for its sensitivity to penicillin; 10% broth saline suspensions of staphylococci, using inocula of 20–500 viable organisms from the 24-hour broth culture, were spread on nutrient agar plates containing 0·05–0·2 unit/ml. of penicillin. Staphylococci showing any resistance were tested for penicillinase production by the Heatley cylinder method (Duthie 1944) after incubation of a 24-hour broth culture with 2 units of penicillin/ml. for 6 hours.

Phage (Wilson and Atkinson 1945) and serological typing of over 100 strains of *Staph. aureus* were kindly undertaken by Dr. V. D. Allison, of the Staphylococcal Reference Laboratory, Colindale, London. The aim was to compare nose, skin, and, if available, wound types at the beginning and end of penicillin therapy.

TABLE II—20 PERSISTENT CARRIERS RECEIVING NO NASAL PENICILLIN, SHOWING THE PROPORTION OF SWABS YIELDING *Staph. aureus*

Days (Day 1 = day of first swab)	Nose		Skin	
	Swabs	Positive	Swabs	Positive
1 to 5	66	62 (*93%*)	63	38 (*60%*)
6 to 10	47	40 (*85%*)	44	24 (*54%*)
11 to 15	25	23 (*92%*)	23	10 } (*58%*)
16 to 25	13	11 (*85%*)	13	11 }
Total ..	151	136 (*90·1%*)	143	83 (*58·0%*)

Nose Results

All available "persistent" nasal carriers were swabbed daily. The effect of intranasal penicillin may therefore be recorded in terms of any change in the proportion of nasal swabs which yielded *Staph. aureus* in 5-day periods before, during, and after treatment. In a group of 21 patients (see table I) the nasal carriage-rate fell from 97% before treatment to 67%

TABLE I—21 PERSISTENT CARRIERS TREATED WITH INTRANASAL PENICILLIN FOR TEN DAYS, SHOWING PROPORTION OF SWABS YIELDING *Staph. aureus*

Days (Day 1 = first day of nasal penicillin)	Nose						Skin	
	Penicillin spray (10 patients)		Penicillin cream (11 patients)		Total (21 patients)		Total (15 patients)	
	Swabs	Positive	Swabs	Positive	Swabs	Positive	Swabs	Positive
−10 to −6	9	9 (*100%*)	26	25 (*96%*)	35	34 (*97%*)	28	16 (*57%*)
−5 to −1	17	17 (*100%*)	32	29 (*91%*)	49	46 (*94%*)	39	25 (*64%*)
1 to 5	39	25 (*64%*)ss	39	27 (*69%*)ss	78	52 (*67%*)ss	54	22 (*41%*)?s
6 to 10	26	7 (*27%*)ss	38	17 (*45%*)ss	64	24 (*37%*)ss	52	20 (*38%*)s
11 to 15	30	10 (*33%*)ss	28	16 (*57%*)ss	58	26 (*45%*)ss	46	21 (*46%*)
Total 1 to 15	95	42 (*44%*)ss	105	60 (*57%*)ss	200	102 (*51%*)ss	152	63 (*41%*)

Each percentage shown in the table has been compared with the percentage found for the same site among persistent carriers receiving no chemotherapy (see table II: nose, 90·1%, skin, 58·0%).

ss, probability of 1 in 140 or less of the difference being a chance event; s, probability of 1 in 80 of the difference being a chance event; ?s, probability of 1 in 36 of the difference being a chance event.

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during the first 5 days and to 37% during the last 5 days of intranasal penicillin. In contrast to these findings the 20 untreated patients (table II) had a nasal carriage-rate which did not vary with stay in hospital, and was not significantly different from the intranasal-penicillin series before treatment was started. Comparing the average for the untreated patients with the carriage-rates during intranasal-penicillin therapy, it will be seen (table I) that the differences are significant to a degree extremely unlikely to be due to chance alone. Thus both penicillin spray and cream significantly reduced the nasal carriage-rate of *Staph. aureus*.

Unfortunately the patients did not stay in hospital long enough for us to collect adequate data on the rate at which *Staph. aureus* reappeared in their noses after penicillin was stopped. Table I shows the findings for the first 5 days after discontinuing penicillin (days 11–15).

The effect of a 10-day course of intranasal penicillin on the individual patient may be expressed in terms of his last 5 nose swabs. We have termed a success any patient who had at least 3 of these 5 swabs negative. Thirteen were successes, six were failures, and two could not be classified because they had less than 5 swabs during treatment before discharge from the ward.

We have compared the successes and failures in terms of the following data: nose and skin swab results before treatment; middle-fossa swab result; phage typing on nose and skin strains of *Staph. aureus* at the beginning and end of treatment; penicillin-sensitivity tests on single strains from most positive swabs; and the clinical records of age, diagnosis, possible focus of sepsis, and nasal physical signs. The numbers are small, but there is no apparent difference between successes and failures apart from the finding that two failures (but no success) yielded an appreciable number of penicillin-resistant strains of *Staph. aureus*.

One of the nasal failures (fig. 1, no. 9) yielded a resistant strain of *Staph. aureus* for the first time on the 8th day of intranasal penicillin, which was also the 9th day of systemic penicillin. Thereafter 3 of the 5 positive swabs yielded strains of *Staph. aureus* resistant to at least 0·1 unit/ml. of penicillin but not producing penicillinase. Another failure (fig. 1, no. 12) yielded some partially resistant *Staph. aureus* during treatment.

Theoretical reasons for the failures are discussed below. The successes are of particular interest when considered in relation to the parallel findings on the skin.

Skin Results

The proportion of skin swabs yielding *Staph. aureus* during the different 5-day periods has been shown in parallel with the nose results in table I. The skin carriage-rate of 57% before treatment fell to 41% during the first 5 days and to 38% during the second 5 days of nasal therapy. These results may be compared with the over-all average of 58% for the skins of untreated patients (table II).

Examination of the nasal failures as defined above shows that these patients continued to carry *Staph. aureus* on the skin (figs. 1 and 2). Their swab results have therefore obscured the fall in carriage of the other patients. Taken alone, the intranasal-penicillin successes show a considerable drop in skin carriage (figs. 1 and 2) during intranasal-penicillin therapy. These results are obviously not comparable with the larger series, but the percentage of swabs yielding *Staph. aureus* before treatment started (57%) is very significantly different from the percentage (10%) during the last 5 days of intranasal penicillin (difference = 47, S.E. of difference = 12).

We consider that these experimental results may be taken as strong evidence that in 8 patients successfully treated with intranasal penicillin the skin of the wrist had been directly contaminated with *Staph. aureus* from the nose.

Phage typing demonstrated that in 6 of these 8 patients the strains of *Staph. aureus* first examined from nose and skin were the same or could be the same. One patient had no skin strain examined. From the other patient (fig. 1, no. 5) at least four different types were isolated from nose and skin. The first pair were different; the pair on the seventh day of intranasal penicillin were alike. The numbers are extremely small, but the findings from the 8 patients are of the order to be expected from pairs of sites one of which is being contaminated by the other.

TABLE III—15 PATIENTS TREATED WITH SYSTEMIC PENICILLIN COMPARED WITH 20 RECEIVING NO CHEMOTHERAPY, SHOWING THE PROPORTION OF SWABS YIELDING *Staph. aureus*

Site swabbed	Days*	Intramuscular penicillin (15 patients)		No chemotherapy (20 patients)	
		Swabs	Positive	Swabs	Positive
Nose	1 to 5	51	25 (49%)	53	25 (47%)
	6 to 10	43	23 (54%)	68	42 (62%)
	11 to 15	24	10 (42%)	41	26 (63%)
Skin	1 to 5	51	13 (26%)	53	16 (30%)
	6 to 10	43	11 (26%)	68	26 (38%)
	11 to 15	24	5 (21%)	41	11 (27%)

* Day 1, for persons receiving chemotherapy = 1st day of treatment.
" " not receiving " = day of admission.

Comparing the penicillin with the no-chemotherapy group, fourfold tables were made for each 5-day period, first for nose and then for skin swabs. Using the χ^2 test, there was in no instance any significant difference between penicillin and control groups.

TABLE IV—NASAL VESTIBULE AND MIDDLE-FOSSA SWABS FROM PERSISTENT CARRIERS, SHOWING THE PROPORTION OF INITIAL SWABS YIELDING *Staph. aureus*

Site	Swab result	
	No. of patients	No. positive
Vestibule	34	26 (76%)
Middle fossa ..	34	11 (32%)

Difference between the two percentages = 42. S.E./difference = 11.

SYSTEMIC PENICILLIN

Some of the persistent carriers, including 3 nasal successes, received systemic penicillin some time during their stay in hospital. It was theoretically possible that the blood-penicillin level secured with systemic or intranasal penicillin might have contributed to the reduction of *Staph. aureus* on nose or skin. To prove that the blood-penicillin level attained had no such effect, we describe some of the results of a 3-month ward survey in which we swabbed all patients receiving any form of chemotherapy. During the second half of the survey period every new admission was included to afford controls.

Table III compares the *Staph. aureus* carriage-rate of all patients (15) who received at least 100,000 units of penicillin daily for at least 4 days and no other chemotherapy with that of all patients (20) who received no chemotherapy at all. Since most patients received their first injection on or before admission, it was impossible to take swabs before treatment. Our experience with intranasal penicillin would lead us to expect any reduction in *Staph. aureus* nasal carriage to begin towards the end of the first 5-day period and to be, at least in part, maintained during the first few days after penicillin therapy ceased. The results show no indication of this. Taking each 5-day period, there is no significant difference between the patients receiving penicillin and the patients who had no chemotherapy. The individual

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results of the 4 persistent carriers, who are therefore comparable with the intranasal-penicillin series, are shown in fig. 1.

It is clear that systemic penicillin did not reduce nose or skin *Staph. aureus* carriage under the conditions described above. Therefore the blood-penicillin level attained by any case in the intranasal-penicillin series could not have influenced our skin-carriage findings.

The failure of systemic penicillin to influence nose or skin carriage of *Staph. aureus* was not due to the presence of penicillin-resistant staphylococci, since no organism tested was resistant to more than 0·1 unit/ml. of penicillin. That the failure was probably not due to persistent contamination from outside sources of staphylococci is suggested by the following findings:

(1) At least 4 patients yielded identical phage types of *Staph. aureus* on nose and skin at the beginning and end of their systemic penicillin. Since there were various phage types in the ward at the time, it is unlikely that the identical types were derived from a source outside the patient.

(2) Three patients with some staphylococcal focus of sepsis received intranasal penicillin (fig. 1, nos. 2, 5, and 13). Two of these were nasal successes. At least in these patients, therefore, outside contamination was not obscuring the results.

(3) There were 3 patients who received systemic penicillin and had no staphylococcal focus of sepsis. These patients all showed no fall in nose or skin carriage during their systemic treatment.

Though these findings suggest that our nose and skin results were probably not being vitiated by contamination from wounds, it is important to emphasise that the failure of systemic penicillin was a failure in a surgical ward containing surgical sepsis.

The theoretical possibilities for failure include inadequate dosage and, the more likely reason, the inability of penicillin in the bloodstream to reach the staphylococci in nose and on skin. This is discussed below.

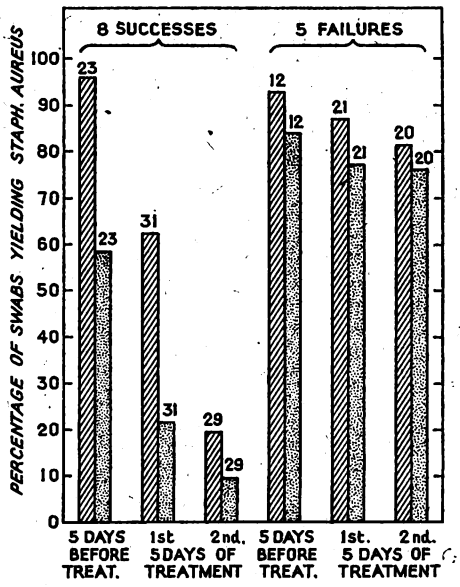

Fig. 2—Effect of intranasal penicillin on nose and skin carriage of *Staph. aureus*: hatched columns, nose swabs; stippled columns, skin swabs; numerals at heads of columns indicate number of swabs on which percentages are based.

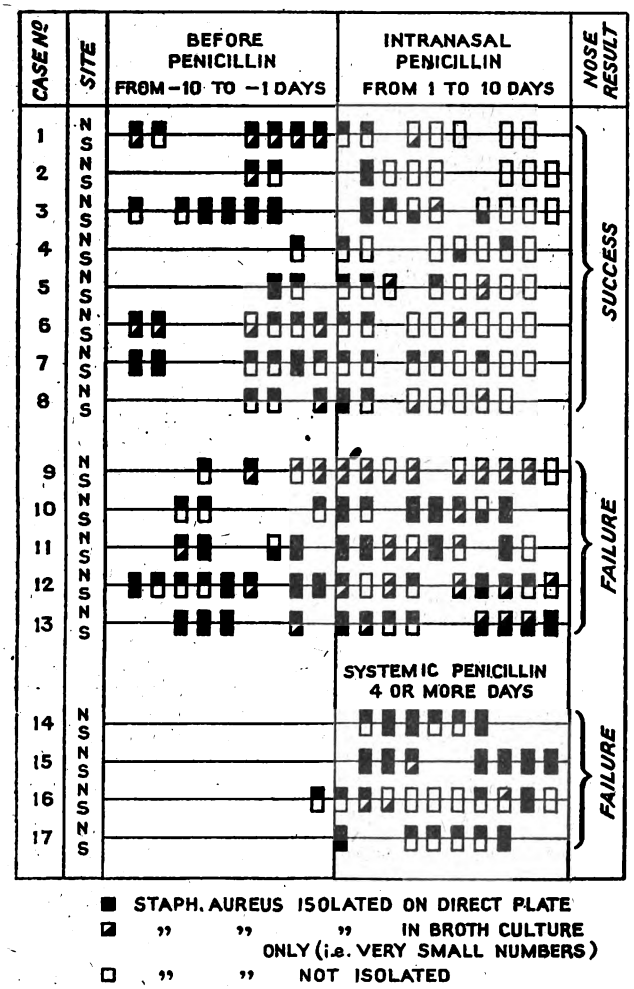
CASE Nº
SITE
BEFORE PENICILLIN FROM −10 TO −1 DAYS
INTRANASAL PENICILLIN FROM 1 TO 10 DAYS
NOSE RESULT
SUCCESS
FAILURE
SYSTEMIC PENICILLIN 4 OR MORE DAYS
FAILURE
STAPH. AUREUS ISOLATED ON DIRECT PLATE
" " " IN BROTH CULTURE ONLY (i.e. VERY SMALL NUMBERS)
" " NOT ISOLATED

Fig. 1—Daily swab results from 17 persistent carriers receiving penicillin: *Success*, at least 3 of last 5 swabs did not yield *Staph. aureus*; *Failure*, at least 3 of last 5 swabs yielded *Staph. aureus*; N, nasal swab; S, skin swab.

SPECIAL NASAL EXAMINATION AND SWABBING

The question arose whether patients persistently carrying *Staph. aureus* in the vestibule might not have an abnormal architecture of the nasal fossæ or have rhinitis or sinusitis. Clinical examination of the patients in this series showed no excessive frequency of abnormality.

At an early stage of the investigation it was considered that the nasal fossæ were more likely to be infected by the vestibule than the reverse. The direction of the flow of the mucous blanket of the nasal mucosa from before backwards, and the relative paucity of the bacterial flora in the healthy nose (Thomson and Hewlett 1895, Cruickshank and Cruickshank 1931) are suggestive points in this reasoning. The more recent introduction of the coagulase test for identifying potentially pathogenic staphylococci (*Staph. aureus*) made a repetition of the earlier work seem worth while.

Method of Swabbing the Nose

Vestibule.—The squamous region of the vestibule was swabbed under direct vision with the aid of forehead illumination from a head-lamp, moistened swabs being used identical with those necessary for swabbing the fossæ.

Nasal Fossæ.—A broth-moistened swab was used, mounted on wire and guarded by sterile glass tubing 11 cm. long. With forehead illumination and a nasal speculum the swab was inserted (guarded) through the nares; pushed out to sample the anterior extremity of one middle turbinal; and withdrawn into the glass tubing before being removed. There was still, therefore, the risk of contamination of the swab by the extreme tip of the guarded tube which may have touched vibrissæ or vestibular skin. Where both nasal fossæ were narrow, an area on the septum or lateral-fossa wall just in front of the middle turbinal was swabbed. In no case was it necessary to be content with swabbing the inferior turbinal. The swabs, after careful heating of the glass guard, were pushed out and then examined for *Staph. aureus* as described above.

Results

The results of the first pair of vestibule and fossæ swabs taken from all persistent nasal carriers in the ward are shown in table IV. It will be seen that in this

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group *Staph. aureus* was isolated less often from the middle fossa (11 patients) than from the squamous epithelium of the vestibule (26 patients). It must be emphasised that, though the middle-fossa swab may have been contaminated from the vestibule, the reverse is impossible. We may therefore have under-estimated the difference in incidence of *Staph. aureus* in the two sites. There is no doubt that in our 34 patients there was a significantly higher carriage-rate in the vestibule than in the middle fossa.

In the only 5 patients investigated, phage typing demonstrated in 3 the similarity of the strains of *Staph. aureus* isolated from middle fossa and vestibule. In the other 2 patients the middle-fossa type differed from the vestibular type isolated the same day but was the same as the type isolated from a crude nose swab a few days later. Since only a single *Staph. aureus* colony was examined from each swab, it is impossible to know whether the different types were present on the same day in both fossa and vestibule.

That *Staph. aureus* is rare in the nasopharynx is well established (Ministry of Health 1930). We therefore took nasopharyngeal swabs from only 9 persistent nasal carriers, one of whom yielded *Staph. aureus*.

These findings emphasise the decreasing frequency of *Staph. aureus* as one passes from nasal vestibule to middle fossa and to nasopharynx, and provide a little evidence in favour of the similarity of types of *Staph. aureus* in middle fossa and vestibule. The data accord with the hypothesis that the squamous epithelium of the vestibule is the site of colonisation of *Staph. aureus*, and that the middle fossa and nasopharynx are contaminated by chance spread from this site.

DISCUSSION

We have used intranasal penicillin experimentally to reduce *Staph. aureus* carriage and noted the associated findings on the skin.

Penicillin cream or spray in a total of 50,000–100,000 units over 10 days reduced detectable nasal *Staph. aureus* carriage in a group of 21 persistent carriers. This accords with the earlier finding of Delafield et al. (1941) that a smaller dosage of penicillin snuff reduced the over-all numbers of staphylococci, and may be compared with the findings in persistent carriers treated by Knott and Blaikley (1946) with a nasal spray. Their findings are, however, expressed in weeks, not days. In most of our patients *Staph. aureus* carriage was reduced from the third day onwards, many swabs being negative even by the more delicate method of broth subculture.

We can offer no evidence to explain the varying degrees of failure. Theoretically, slight variation in the distribution of *Staph. aureus* in the nasal squamous epithelium and its appendages, and contamination from facial skin or skin of the wrist are possibilities which need further investigation.

Systemic penicillin in a daily dosage of 100,000 units failed in 15 surgical patients (12 with possible staphylococcal foci of sepsis) to influence nose or skin carriage of *Staph. aureus*. The failure may be explained on the hypothesis that the site of *Staph. aureus* on the epithelium of skin or nasal vestibule is not reached by any transudate from the capillary blood. In support of this, it has been shown that neither human sweat (Cornbleet et al. 1947) nor cat's tears (Abraham et al. 1941) contain any demonstrable penicillin after systemic injections. The relevant fact is that circulating penicillin could not have caused the fall in nose and skin *Staph. aureus* carriage observed during intranasal-penicillin therapy.

Our experimental finding that reduction of nasal *Staph. aureus* carriage is associated with a significant fall in carriage on wrist skin strongly suggests that, at least in 8 of the 13 persistent nasal carriers, the nose was the predominant source of the *Staph. aureus* on the wrist. This accords with the hypothesis put forward by Miles et al. (1944) that the skin is often contaminated from the nose—a hypothesis based on the observational findings reviewed at the beginning of this paper.

It is difficult in practice to demonstrate whether colonisation or contamination is taking place. Both often take place on the same site, colonisation implying local conditions which allow the multiplication and survival of the organism, and contamination implying reinforcements from some outside source. Given any individual persistently carrying the same phage type of *Staph. aureus* in one site, the deduction must be that either the site is colonised or is being continually contaminated from a second colonised site.

We have repeated the experiments of Thomson and Hewlett (1895) using the more recent coagulase test to identify *Staph. aureus*. The much higher incidence of this organism in the nasal vestibule than in the middle fossa suggests, in the absence of any other probable contaminating source, that the squamous epithelium of the vestibule is the primary site of colonisation.

In the patients successfully treated with intranasal penicillin the changes in skin *Staph. aureus* carriage took place without any known alteration in local skin conditions and followed abruptly and closely the alterations in nasal carriage. The skin findings in these 8 nasal successes could therefore be explained entirely in terms of contamination, nasal contamination predominating.

In the 5 patients in whom intranasal penicillin was a failure, the close association between nose and skin carriage could be due to colonisation of either or both sites. It is well known that *Staph. aureus* can be persistently isolated from healed as well as from healing wounds and burns. There are persons with intact skin who carry this organism with an abnormal heaviness and persistence in a multiplicity of sites. It is clear that the incidence and significance of *Staph. aureus* skin colonisation require further investigation.

Any therapeutic or prophylactic value of intranasal penicillin will depend on whether or not outside sources of contamination are small enough for the removal of nasal contamination to make a significant difference. As described above, intranasal penicillin has already been recommended in the treatment of nasal carriers discovered in maternity homes and of sycosis barbæ. Hobbs et al. (1947) have emphasised the probable importance of nasal staphylococci in this skin disease by demonstrating the identity of serological types in nose and lesion. Intranasal penicillin might be of value in preventing the staphylococcal contamination of skin surfaces in burns (Colebrook et al. 1947) and other skin lesions. Only further experiments will help to elucidate these points.

SUMMARY

Intranasal penicillin has been used experimentally in a male surgical ward to test the relationship between nose and skin carriage of *Staph. aureus* in persistent carriers.

In 21 patients a 10-day course of intranasal penicillin significantly reduced nasal carriage during treatment. There was an associated significant fall in skin carriage. This is taken as strong experimental evidence that the skin was, in these patients, contaminated from the nose.

In 15 patients systemic penicillin, under the conditions described, did not reduce nose or skin *Staph. aureus* carriage.

Special vestibular and middle-fossa nasal swabs were taken from 34 patients. The proportions of *Staph. aureus* isolated, 5 pairs of phage-typing results and 9 nasopharyngeal swab results, supported the hypothesis that the focus of *Staph. aureus* colonisation was the squamous epithelium of the nasal vestibule.

The significance of nose-to-skin contamination by *Staph. aureus* is discussed. Intranasal penicillin may effectively reduce this contamination; but the prophylactic and therapeutic value of intranasal penicillin

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in staphylococcal skin infections will depend also on the absence of significant contamination from other sites.

We are indebted to Mr. William Gissane, clinical director of the Birmingham Accident Hospital, for permission to investigate these cases; to Sister M. M. Taylor for much help and for supervising penicillin therapy; to Mr. G. J. Harper and Mr. E. G. Knott and their technical assistants for much of the laboratory work; to Dr. V. D. Allison of the Staphylococcal Research Laboratory, Colindale, for the phage typing and much assistance; and to Prof. A. Bradford Hill and Dr. W. J. Martin, of the London School of Hygiene and Tropical Medicine, for statistical advice.

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PROPERTIES OF BOVINE SERUM HEATED WITH FORMALDEHYDE

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IN the search for substitutes for human plasma Edwards (1944) and later Massons (1946) investigated bovine serum treated with formaldehyde (formol) and heated. Infusions of bovine serum treated in this way were given to over 200 patients by Edwards (1946) and to 300 patients by Massons with apparently good results. Mělka et al. (1947) claim to have confirmed Massons's results and conclude that calf plasma prepared by his method should prove a highly satisfactory substitute for human blood and plasma in transfusion practice.

A substitute for human plasma must be non-toxic and non-antigenic, and it must have a colloid osmotic pressure at least comparable with that of human plasma. Massons showed that in guineapigs, rabbits, and dogs no anaphylactic reaction followed the injection of bovine serum heated with formaldehyde to 100°C, and, according to Edwards (1946), destruction of the agglutinins is associated with changes in the globulin fraction after heating to 72°C; but no further investigations of the antigenic properties of the serum seem to have been made. Gutfreund and Ogston (1945) found that when serum with added formaldehyde is heated there is an aggregation of the proteins to form a polydisperse system of larger particles. This aggregation progresses with increasing temperature and causes a fall in colloid osmotic pressure and a considerable increase in viscosity. Heating for 30 min. to 70°C and 80°C resulted in a reduction of colloid osmotic pressure to 58% and 48% respectively of that of untreated serum. Mělka et al. (1947) found no reduction in colloid osmotic pressure when plasma was heated to 100°C, but they gave no experimental details. On the other hand, Edwards (1946) reported that when serum, to which formaldehyde and ammonia had been added, was heated to 100°C it showed no colloid osmotic pressure at all. Because of this disagreement in results it is not clear whether heating which destroys the antigenic properties of serum also results in the preparation having a colloid osmotic pressure too low to be of use in the treatment of peripheral vascular insufficiency. In this paper we report an attempt to solve this problem.

PRESENT INVESTIGATIONS

Serum was prepared from fresh bovine blood according to the method described by Massons.

The serum having been separated from the blood-cells and fibrin in a centrifuge, formaldehyde was added to a final concentration of 0·35%, and ammonium hydroxide to a final pH of 7·2. (In some of the earlier preparations about an equal volume of 6% glucose was next added, but this step was discarded because the same precipitation occurred in diluted and in undiluted serum.) The serum was heated in 200 ml. portions on a boiling-water bath, where it was kept for the required time at a constant temperature; it was then cooled under the cold tap, placed in ampoules, and stored in the ice-box.

Toxicity.—Three rabbits, each weighing 2000–2500 g., were injected intravenously with 18 ml. of formol-serum heated to 95°C for 2 min., apparently without effect. A further four rabbits of the same weight, anæsthetised with urethane, were given 35–45 ml. intravenously over a 19-min. period; the blood-pressure, simultaneously measured, remained unchanged. Finally, three rabbits were each given an average of 93 ml. of the serum intravenously during 20 min., and the blood-pressure showed only a slight increase; one of these three rabbits died after 1 day and another after 2 days.

In a second series of experiments ten rabbits were bled, an average of 61 ml. of blood being taken. For this amount was substituted 50 ml. of formol-serum heated to 95°C for 2 min. No immediate toxic effect was seen, but one of the animals died within 12 hours, and another after 2 days. The remaining eight rabbits lived a month or more after the experiment.

The toxicity of untreated plasma was considerably higher. Four rabbits showed no symptoms after receiving 10 ml. intravenously, and one survived 20 ml. But when five rabbits were bled and then injected intravenously with about 35 ml. of untreated plasma, four died within 12 hours and the only one that survived showed severe toxic symptoms.

Antigenic Effects.—The antigenic properties of formol-serum heated to 95°C for 2 min. were tested both in vitro and in vivo. In-vitro tests were based on the precipitin test and the complement-fixation test. Two series of rabbits were treated with intravenous injections of 2 ml. of serum every second day; one series received untreated bovine serum, while the other was given the formol-serum. After 2 and 3 weeks from the start of treatment, the rabbits' serum was tested against untreated bovine serum and formol-serum.

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The technique was the same as that used in Statens Seruminstitut, Copenhagen, for routine clinical work. The serum of the rabbits treated with bovine serum showed a well-marked reaction when tested with untreated bovine serum. The precipitin reaction was detectable in dilutions up to 1 : 64, and complement-fixation in dilutions of 1 : 256. This serum gave no reaction at all when tested against undiluted formol-serum. The serum of rabbits treated with formol-serum gave no reaction with either untreated serum or formol-serum.

In-vivo tests were carried out with rabbits and guinea-pigs. Four series of experiments were done on rabbits. The animals were injected with either formol-serum or untreated serum. After 12–30 days a second injection of formol-serum or untreated bovine serum was given. During this second injection the blood-pressure or the respiration-rate was measured in some of the animals; a fall in blood-pressure and rapid shallow respirations are very sensitive indicators of shock. Experiments of the same kind were carried out with guineapigs, and the results are given in table I.

From these experiments with rabbits and guineapigs it is clear that formol-serum heated to 95°C for 2 min. has much weaker antigenic properties than untreated bovine serum; but the experiments with rabbits show that treated serum is not entirely devoid of antigenic properties, for a pronounced effect is seen in the series where the animals were sensitised with formol-serum and later injected with untreated serum, as well as in the series where the rabbits were sensitised with untreated serum and later injected with formol-serum.

Experiments on Colloid Osmotic Pressure.—The colloid osmotic pressure was measured by the method of Krogh and Nakazawa (1927) with slight and insignificant modifications. Determinations were made on the serum

TABLE I—ANTIGENIC EFFECTS ON RABBITS AND GUINEAPIGS OF UNTREATED BOVINE SERUM AND OF BOVINE SERUM HEATED WITH FORMALDEHYDE TO 95°C FOR 2 MIN.

No. of rabbits	First injection (serum and dose)	Second injection		
		Days after first injection	Serum and dose	Results
14	Formol-serum 14–60 ml.	12–30	Formol-serum 20–35 ml.	Slight or no effect on respiration; none died
3	Untreated serum 10–20 ml.	12–30	Formol-serum 20–35 ml.	Pronounced effect on respiration and diminished blood-pressure in two animals; none died
9	Formol-serum 14–60 ml.	14–30	Untreated serum 2–10 ml.	Slight or no effect on some animals; severe fall in blood-pressure in two surviving animals; one died of shock
5	Untreated serum 10–20 ml.	14–30	Untreated serum 2–10 ml.	Typical shock in all animals; severe fall in blood-pressure in three surviving animals; two died

No. of guinea-pigs	Sensitising agent	Intravenous injection after 14 days	Results
5	Formol-serum	Formol-serum 1–2 ml.	No shock
3	Untreated serum	Formol-serum 1–2 ml.	No shock
5	Formol-serum	Untreated serum	No shock
5	Untreated serum	Untreated serum	All died of typical shock

TABLE II—EFFECT OF HEATING FORMOL-SERUM ON ITS COLLOID OSMOTIC PRESSURE AND ANTIGENIC PROPERTIES

Treatment of plasma	Colloid osmotic pressure			Production of shock *
	No. of experiments	mm. Hg	% of initial value	
Untreated	8	20·0 ± 0·4	100	All died in 4–5 min.
Formaldehyde and ammon. hydrox.; not heated	3	15·6 ± 1·0	80	All died in 4–5 min.
Formaldehyde and ammon. hydrox.; heated to 50°C for 2 min.	..	..	..	All died
Formaldehyde and ammon. hydrox.; heated to 75°C for 2 min.	7	12·6 ± 0·3	63†	Half died
Formaldehyde and ammon. hydrox.; heated to 95°C for 2 min.	9	9·3 ± 0·2	48	None died

* Tested on guineapigs sensitised 3 weeks previously with the plasma to be tested. The test was performed by injecting 1–2 ml. of plasma intravenously; 6 animals were tested in each group.
† The colloid osmotic pressure was the same with heating for any time up to 15 min.

both before and after treatment with formol and heating. The colloid osmotic pressure of the untreated serum was 20·0 ± 0·4 mm. Hg. In the last series of experiments the fall in colloid osmotic pressure after heating and the antigenic properties of the heated plasma were compared. From table II it will be seen that serum heated to 95°C for 5 min. has less than half the colloid osmotic pressure of the original serum—a considerable loss. Moreover, even treatment resulting in a reduction to little less than two-thirds of the initial colloid osmotic pressure does not completely destroy the antigenic properties.

DISCUSSION

These experiments confirm previous claims that the toxicity of bovine serum is greatly reduced by heating with formaldehyde. The same effect is seen when the antigenic properties of the treated formol-serum are examined. This decline is, however, associated with a 50% reduction in the colloid osmotic pressure of serum which has been sufficiently freed from antigenic properties not to produce anaphylactic shock in guineapigs. This means that the therapeutic effect is reduced by half, and the dose of the treated serum must be correspondingly increased. For this reason the doses given in the toxicity experiments on rabbits are not exceptionally high, and as seen in the experiments the lower limit of safety seems to be surpassed with the doses given.

Furthermore, although the in-vitro tests and the anaphylactic-shock tests on guineapigs were negative in these experiments, the tests on rabbits given doses comparable with those used clinically show that slight or even serious toxic reactions can occur in some individuals. Bing (1947) found that even treatment more intense than that adopted here did not free the serum from antigenic properties. In fact, his experiments show only a very slight decline in the antigenic properties. Both Bing's and our experiments indicate that grave effects may ensue in some patients after repeated injections.

In spite of the favourable clinical reports on the usefulness of formol-treated bovine plasma or serum in several hundred cases, a word of caution is probably indicated. Since the colloid osmotic pressure of formol-treated bovine serum sufficiently freed from antigenic properties is at most only a third of that of human plasma, the doses must be three times as high to get the same therapeutic effect; and from the present investigations it seems doubtful whether 1–2 litres, which must be

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regarded as the smallest sufficient dose, can be given without untoward effects.

SUMMARY

Bovine serum treated with formaldehyde and heated showed slighter toxicity and antigenic properties than untreated serum.

To avoid anaphylactic reactions in guineapigs the serum had to be treated so intensively that the colloid osmotic pressure was reduced to less than 50%.

The formol-treated serum showed some toxicity and antigenic effects when injected into rabbits in doses comparable to those required clinically as a plasma substitute.

A warning must therefore be given against the uncontrolled use of formol plasma or serum.

We are indebted to Prof. Brandt Rehberg for allowing us to carry out the osmotic-pressure determinations in the University of Copenhagen Zoophysiological Department.

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RETROPHARYNGEAL LIPOMA

REPORT OF A CASE

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LIPOMAS are often found in the cervical region but are fairly rare close to the pharynx.

The most recent reference to them was in 1940, when Putney and Fry [1] published 2 cases, one in a man aged 37 and the other in a man aged 40. In 1927 Figi and Hunt [2] included a case of their own from the Mayo Clinic in a series of 35 collected cases of lipoma of the pharynx. Previously, in 1926, Herriman [3] reported 25 cases in patients whose ages ranged from 4 to 92 years.

The present case is of interest because of the tender age of the patient.

A female infant, aged 3 months, was admitted to the Royal Liverpool Children's Hospital with six weeks' history of difficulty in breathing and occasional apnœa for half a minute. She took very little food, breathed through her mouth, and appeared to be losing weight.

In hospital she fed slowly and with great difficulty. Radiography of the neck revealed nothing abnormal. Examination of the blood showed a high polymorph and monocyte count, pointing to a severe septic type of infection. A lump on the left side of the pharynx suggested the diagnosis of retropharyngeal abscess.

Operation.—The lump was incised under light ether anæsthesia. The mass felt hard to the touch, and no pus was obtained. Four days later the pharynx was examined again, and a white branch of the lipoma was seen through the first incision, which on being extended from the level of the uvula to the glottic rim revealed an encapsulated mass of yellowish-white tissue.

The mass was removed in the same way as a tonsil, and the gap was closed with interrupted catgut suture. Penicillin was injected three-hourly for four days. The baby made an uninterrupted recovery, her feeding improved, and her weight steadily increased.

Histology.—The specimen was an irregular mass of fatty tissue with a fibrous-tissue reticulum and measuring $1^1/_4$ in. by 1 in., enclosed in a capsule—i.e., a simple lipoma.

I am indebted to Dr. R. W. Brookfield for permission to publish this case.

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CALCIUM CONTENT OF SKIN IN LUPUS VULGARIS TREATED WITH CALCIFEROL

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THAT the Sauerbruch-Hermannsdorfer diet leads to decline in the chlorine content and a simultaneous rise in the calcium content of diseased skin was pointed out by Hermannsdorfer (1931). Van der Schaaf and van Ormondt (1932) found that the calcium content of the guineapig's skin was reduced by 10% when table salt was added to a diet rich in calcium, whereas a reduced salt intake had the opposite effect.

To ascertain whether there is any change in the calcium content in clinically healed lupus tissue of patients treated with calciferol, skin biopsies have been made over six months in patients attending the skin clinic of the Coventry and Warwickshire Hospital. The number of cases investigated is unfortunately small, limited by the number of suitable and willing patients, but I think that the consistent results are significant enough to warrant publication.

All the patients investigated had been treated for six months, except Miss W, who was treated for three months, and the standard dosage of calciferol was 150,000 units a day by mouth. In the case of Mrs. Y this was changed to 'Ostelin' injections 300,000 units twice weekly for the last three months owing to intolerance. Routine serum-calcium estimations were made throughout also on the day of biopsy, and in no case did these show a gross enough deviation from normality to merit consideration. All the patients were on a normal mixed diet, none receiving extra milk or calcium by mouth.

Specimens of fresh skin removed under local anæsthesia were submitted to Miss E. Tonks, M.SC., of the research department of the Birmingham and Midland Eye Hospital, for estimation by the method of Rappaport and Rappaport (1932):

The skin specimen is dried, its dry weight ascertained (usually 0·01 g.–0·04 g.), and then ashed. The ash is dissolved in hydrochloric acid, neutralised, and the calcium precipitated with ammonium oxalate. After repeated washings to remove excess ammonium oxalate, the precipitate is dissolved in sulphuric acid, and the free oxalic acid is oxidised by the addition of a measured quantity of accurate cerium sulphate solution. The excess of cerium sulphate is determined by titration with sodium thiosulphate. Results are given in terms of dried weight.

The following amounts of calcium were found:

Normal skin from non-lupus patients:
Mrs. S: 30 mg. per 100 g. of dried skin.
Mr. T: 44 mg. per 100 g. of dried skin.

Scar tissue from non-lupus patients:
Mr. U: 35 mg. per 100 g. of dried tissue of old fracture scar.
Mr. V: 29 mg. per 100 g. of dried tissue of lobectomy scar a month old.

Untreated active lupus:
Miss W: 40 mg. per 100 g. of dried skin.

Healed lupus:
Miss X: 74 mg. per 100 g. of dried skin.
Mrs. Y: 71 mg. per 100 g. of dried skin.
Mr. Z: 63 mg. per 100 g. of dried skin.

The consistently higher calcium content of healed lupus made it necessary to compare normal skin with healed lupus skin taken from the same patient on the same day. This gave the following results:

Date	*Patient*	*Calcium content (mg. 100g. dried skin)*	
		Normal skin	*Healed lupus*
June 14, 1947	Mrs. Y	50	68
June 5, 1947	Miss X	48	74
Aug. 11, 1947	Miss W	34	103

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It is noteworthy that Mrs. Y had not received calciferol for a month and Miss X had not received calciferol for a week, but Miss W was at the time of biopsy taking calciferol by mouth.

It therefore appears that a localised increase of calcium (form not yet determined) occurs during healing in lupus tissue and may be essential for the arrest of the tuberculosis. Calciferol in the presence of lupus tissue makes this localised deposition possible.

SUMMARY

Healed lupus skin had a higher calcium content than normal skin from non-lupus patients who had not received calciferol.

Healed lupus skin had a higher calcium content than non-lupus skin taken from the same patient at the same time.

It is suggested that calciferol makes calcium available to lupus tissue.

I am indebted to Miss Tonks for her estimations and suggestions, and to Dr. W. P. Elford, physician in charge of the skin clinic, for permission to publish these cases.

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Reviews of Books

Cancer of the Breast

DUNCAN C. L. FITZWILLIAMS, C.M.G., M.D., CH.M., F.R.C.S., F.R.C.S.E., surgeon, Mount Vernon Hospital and the Radium Institute. London: Heinemann Medical Books. 1947. Pp. 199. 25*s*.

THE object of this book is to put forward Mr. Fitzwilliams's own ideas on breast cancer and its spread, diagnosis, and treatment. The chapter on early diagnosis is useful in recording the signs and symptoms interpreted by a surgeon of long experience; but, like the rest of the book, it includes too many case-histories which add little to the information given. Treatment is by local removal of the tumour by a modified radical operation; or by radium, either implanted or on surface applicators. Mr Fitzwilliams's advocacy of local removal is well known, but remains very difficult to accept in spite of the cases he cites. The radium techniques described are old-fashioned and the dosage is given in milligramme-hours. The chapter on X-ray treatment by Dr. Alice Ross gives the opinions of an individual radiotherapist rather than a description of methods of treatment.

At the end the question has to be asked, "For whom is this book intended?" It is written in a colloquial style, unusual for a specialist work on the treatment of cancer; and though the effects of the author's unorthodox method are interesting, only odd results are given with no background of numbers of cases treated. For the general practitioner the controversy between surgeons is confusing; while the last place in which one would wish to see the book would be in the hands of the lay public.

Physical Fitness Appraisal and Guidance

THOMAS KIRK CURETON, jr., M.A., M.P.E., PH.D., professor of physical education and director of the physical fitness research laboratory of the University of Illinois. London: H. Kimpton. 1947. Pp. 566. 30*s*.

Dr. Cureton, with a number of associates, has measured the cardio-respiratory efficiency, the motor fitness, and physique of thousands of normal young men and women on the Urbana Campus of the University of Illinois, with the corollary of demonstrating the improvement that results from properly prescribed physical exercise. All first-year students in the colleges were submitted to what is appropriately described as a "battery of tests" on a scale which we with our comparatively simple criteria can only regard as colossal. The investigations comprise as their objective physique, organic condition, and motor efficiency; and with unlimited detail these broad considerations are elaborated to comprehend anything and everything that may be included as applicable. It is unlikely that many readers will desire to peruse and study the numerous tables and charts that occupy the major portion of this encyclopædic production. Nor can it be said that such application can be of any value in itself. It is enough to browse, to seek for titbits to satisfy the palate from the heavy fare submitted for mastication and digestion. Furthermore, although the greatest credit must be accorded to the patience and industry that provided such elaboration, it cannot be said that much has been gleaned to replace or displace the conclusions of previous workers with their old-fashioned simplicity. We read of the detailed examination of Arne Andersson and Gunder Hagg, the world-record-breaking Swedish middle-distance runners who competed in this country a couple of years ago. The limitations of laboratory investigations are well reflected in the conclusion that "the results did not explain the remarkable performances of these athletes who would appear to differ from ordinary healthy persons by reason of a well-developed technique and judgment."

Probably every American contribution that has ever appeared on the subject is mentioned in the bibliography, as well as some from Europe. Among British workers the names of F. A. Bainbridge (whose original manual *The Physiology of Muscular Exercise* has been the inspiration of all subsequent work), Martin Flack, Leonard Hill, A. V. Hill, Adolphe Abrahams, F. W. Griffin, and G. E. Friend are included. A comprehensive list of exercises and work items will be of scant comfort to the obese who seek in exercise an aid to reduction. They will learn that to work off one pound of fat (4320 calories) they must walk 144 miles at the rate of 2 miles an hour, or for 66½ miles at 3½ miles an hour, which is a reasonably brisk speed for a "constitutional." Even when running at the pace of a good marathon runner they would have to cover 43 miles, and the same reduction could be obtained by 9½ hours' horseback galloping, by foxtrotting continuously for 16 hours, or by playing the piano for 30–77 hours according to the type of composition.

The Diagnosis of the Acute Abdomen in Rhyme

ZETA. London: H. K. Lewis. 1947. Pp. 88. 5*s*. 6*d*.

Not patience nor dexterity—
No, nor the tools a Nuffield buys—
Can make that surgeon worth his fee
Who will not learn to use his eyes.

Zeta has filled a golden book,
A spendthrift book, that spills unearned
Those vital facts you overlook,
Those finer points you never learned.

If in experience grown grey,
Undoubtedly his wits are green,
Whose craft embraces Z *et* A
And all the alphabet in between.

A Textbook of Mental Deficiency (7th ed. London: Baillière. 1947. Pp. 534. 30*s*.).—A new edition of Dr. A. F. Tredgold's classic is always welcome. New illustrations have been added and the book has been brought up to date in other ways—especially in regard to the effects of the Education Act of 1944, as it applies to educationally subnormal and defective children.

Microscopic Anatomy of the Vertebrates (3rd ed. London: H. Kimpton. 1947. Pp. 354. 30*s*.).—Dr. J. I. Kendall's book, based on selected representatives of the various classes of vertebrate, gives the student of zoology a working knowledge of their microscopic anatomy. Handbooks on comparative histology are scarce, and this is a good one.

Hale-White's Materia Medica (27th ed. London: J. & A. Churchill. 1947. Pp. 549. 15*s*.).—A book that has reached its twenty-seventh edition needs no other recommendation. Dr. A. H. Douthwaite notes in his preface that advances in research, especially in relation to curare, antibiotics, and insecticides, have led him to revise the work completely, and to emphasise the clinical application of pharmacology. The sections dealing with the sex hormones have been revised by Dr. P. M. F. Bishop.

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THE LANCET

LONDON: SATURDAY, FEB. 28, 1948

Terminology of the Rh Factor

THERE must be comparatively few doctors who know precisely what is meant by Rh_0^z and many potential examinees who wish that the wretched Rh factor had never been discovered. During the last few years a knowledge of Rh has become increasingly necessary in practice, while the confusion of differing and changing nomenclatures has made the essential facts increasingly difficult to understand. Anybody wishing to follow developments in this field has had to master two separate languages—that of WIENER on the one hand and of FISHER and RACE on the other.

Faced with the problem of deciding how commercial anti-Rh sera should be labelled, the Surgeon-General of the United States Public Health Service convened a board to review the nomenclature, and their main conclusions have now been published.[1] In their view the Wiener nomenclature has priority; it is in use by many clinicians and research-workers, particularly in America; and the theory on which it is based has not been shown to be incorrect. But its terms give only a partial account of the antigens present; it has changed rapidly from year to year; it involves complications, both typographical and genetic, of subscripts and superscripts, numbers, primes, and other symbols; and it involves the somewhat doubtful assumption of the production by single genes of multiple antigens. The Fisher-Race nomenclature, on the other hand, gives an exact account of the antigens present, is adopted widely in England and increasingly in the U.S.A. and elsewhere, is simple and direct, and uses a single letter for the same genes and antigens; but the scheme "lacks priority and is based on a genetic hypothesis which is purely theoretical and for which no clear proof exists." The board finally recommend that both terminologies should appear on the labels of anti-Rh sera, the Wiener name first, followed by the Fisher-Race within parentheses. The board have clearly taken great pains to reach an impartial decision, but they do not appear to have given full weight to what must surely be regarded as FISHER's unique contribution—the idea of three mutually antithetical pairs of Rh antigens. This conception does not stand or fall by any particular genetic theory. FISHER pointed out that the chromosome concerned with Rh carries C or c, D or d, and E or e, so that eight possible combinations of antigens can be inherited: CDe; cde; cDE; cDe; cdE; Cde; CdE; and CDE. Every human being inherits one of these combinations from each of his parents, and some combinations are far commoner than others, the five commonest genotypes being: CDe/cde; CDe/CDe; cde/cde; CDe/cDE; and cDE/cde. Moreover, each of the six elementary antigens can provoke the formation of a corresponding antibody—for example, a person of the genotype cde/cde, if transfused repeatedly with blood of type CDe/CDe, may form anti-C+anti-D antibodies. These facts are now generally accepted; but in 1943, when FISHER introduced his scheme, the position was far from clear. At that time no-one realised that there were three pairs of mutually antithetical antigens, and the reactions between the distinguishable subtypes and the different sera so far discovered were a bewildering tangle. WIENER, who had played a notable part in the early history of the Rh factor, at first denied the existence of FISHER's then hypothetical antigens d and e and found them incompatible with his own conceptions.[2] Later, however, when MOURANT[3] discovered anti-e and it proved to have precisely the reactions predicted by FISHER, WIENER[4] incorporated the antigen e in his scheme. He was, indeed, one of the first to grasp the importance of FISHER's work and he adopted many of FISHER's other ideas in his own terminology; thus he introduced the terms Hr′, Hr_0, and Hr″ to fall into line with FISHER's idea of a trio of recessive antigens, c, d, and e.

The recommendations of the American board have to some extent been dictated by considerations which do not apply with equal force in this country, and their judgment must be regarded as an interim one. In his letter on another page WIENER sets out the arguments for the exclusive adoption of his nomenclature. Nevertheless, British workers are likely still to prefer the Fisher-Race terminology, because they have found it easier to teach and to memorise, as the following example will show. A person belonging to the second commonest Rh genotype in Europeans would be classed as CDe/CDe in one terminology and as Rh_1Rh_1 in the other; it is easy to see that such a blood would not be agglutinated by the serum anti-E and would be agglutinated by the excessively rare serum anti-e; but how is one to remember whether or not it reacts with anti-Rh″ or anti-hr″? This controversy over nomenclatures must not, however, be mistaken for an argument about the merits of different research-workers' contributions to our knowledge of the Rh factor. If, as seems possible, the Fisher-Race terminology is finally adopted for international use, this will not imply any lack of recognition of the magnificent contribution which WIENER has made to the development of the subject.

Reactions to Cold Weather

THE body protects itself against chilling by increasing heat-production and reducing heat-loss. In "temperate" climates, such as ours, people can be divided roughly into two classes, an active and a passive, according to which of these two methods they favour in cold spells. The active class are braced by the cold; they speak sincerely of "this healthy weather," meaning that it stimulates them bodily and mentally and brings them a sense of well-being; these are the people who revel in cold baths, and in extreme cases break the ice to bathe in the Serpentine. Conversely, the passive class are incapacitated and made miserable by the cold: they huddle themselves in rugs and thick clothes, and are chilled and cyanosed for hours after a cold immersion; like the tortoise they become fully alive only under the hot summer

1. Castle, W. B., Wintrobe, M. M., Snyder, L. H. *Science*, 1948, 107, 27.
2. Wiener, A. S., Sonn, E. B. *Ann. N.Y. Acad. Sci.* 1945, 46, 969.
3. Mourant, A. E. *Nature, Lond.* 1945, 155, 542.
4. Wiener, A. S. *Science*, 1945, 102, 479.

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sun. Class I take pleasure in stimulating the increase in muscular tone which is the main mechanism for raising bodily heat-production, whereas class II keep their skin surface carefully shielded so that this mechanism is rarely invoked. The class to which an individual belongs depends on age (though not all children are in class I nor all septuagenarians in class II); sex (it is not only their deeper subcutaneous fat that makes women stand cold better than men); occupation (military training converted many from class II to class I); endocrine balance (witness the hyperthyroid's dislike of hot weather and the myxœdematous tendency to crouch over the fire); nutrition and general health (the person who is undernourished, whether from insufficient food or malabsorption, instinctively conserves his body-heat); and no doubt many other factors, physical or emotional, endogenous or exogenous, congenital or acquired.

How far the different responses to chilling are associated with the many ailments known to be exacerbated by cold weather is a subject which deserves study. The few unfortunates subject to true cold-sensitivity have merely to immerse one hand in cold water to produce a general urticaria or angio-neurotic œdema. In others peripheral chilling produces a paroxysmal hæmoglobinuria; if a sample of their blood is cooled to 5°C and then rewarmed to body-heat hæmolysis occurs through an auto-hæmolysin produced by the cold. Heightened muscular tension may be important in the causation of "muscular rheumatism," especially where a localised icy draught rapidly chills warm muscles. But it is the tendency of cold to precipitate reflex spasm of vascular and visceral plain muscle that is the most potent cause of trouble. In Raynaud's disease local vascular reactivity to cold reaches an extreme degree. In normal people chilling of the hands raises the blood-pressure from general peripheral vasoconstriction, a phenomenon exploited in the cold-pressor test for blood-pressure lability; perhaps for this reason anginal subjects commonly find that sudden chilling precipitates an attack. Cold is one of the commonest precipitating factors of the visceral neuroses. RYLE[1] describes a case of spastic colon where exposure to a cold east wind produced a palpable tumour which immediately disappeared in a hot bath. Peptic-ulcer patients similarly note the tendency of cold weather—particularly the first spell of cold east wind in autumn—to exacerbate their symptoms, while a thorough warming before a fire or in a hot bath will generally relieve their pain. Here the mechanism is mainly a reflex increase in gastroduodenal tone and peristalsis, but there is some evidence that chilling raises gastric acidity; thus HORTON and colleagues[2] observed that in a cold-sensitive subject the immersion of one hand in water at 10°C produced a rise in gastric acidity comparable to that after an injection of histamine. It seems possible that this rise and the occasional generalised urticaria in sensitive subjects may both result from the liberation of some histamine-like substance in the chilled tissues.

1. Ryle, J. A. Natural History of Disease. London, 1936; p. 170.
2. Horton, B. T., Brown, G. E., Roth, G. M. *Proc. Mayo Clin.* 1937, **12**, 129.

The question arises, if cold is at least a precipitating factor in peptic ulcer and other ailments, why are not these ailments more severe in countries with a more severe climate than our own? The explanation, no doubt, is that people in such countries take good care not to be chilled, whether by wearing protective clothing, by employing more effective methods of house-heating and heat conservation with double windows and similar devices, or perhaps by adjusting their diet so as to make it produce more heat. A diet rich in protein and fat yields more heat than one consisting mainly of carbohydrate; and it is broadly true that the farther one goes from the Equator the higher the proportion of protein and fat in the staple diets of the population. In such climates as ours, where severe cold is sufficiently rare to catch us unprepared, cold hands and feet are probably at least as common as among the Esquimaux. It is partly because we are slow to start heating our homes and offices and to don our full winter clothing that our peptic-ulcer patients find the autumn the worst time for recurrence of their symptoms. The moral is clear: those who suffer generally or viscerally from chilling should prepare for cold in advance, and apply their precautions promptly.

Smear Technique in Cancer Diagnosis

EFFECTIVE removal of a malignant tumour while it is small and localised is still the surest method of treatment, and success therefore depends on early diagnosis. Histological examination provides one of the most valuable aids not only to exact diagnosis but also to early diagnosis, and a growing recognition of the significance of cell activity in relation to treatment and prognosis has renewed interest in cellular pathology.

In the method developed by PAPANICOLAOU and TRAUT,[1] which is based on examination of exfoliated cells, cellular pathology is being applied to the early diagnosis of cancer. PAPANICOLAOU's investigations of desquamated vaginal epithelium began thirty years ago with a study of cells in the vagina of guineapigs; and he later adopted the same method for the early diagnosis of human cancer. ISBELL and colleagues[2] have investigated vaginal smears, prepared according to PAPANICOLAOU's technique, from 1045 patients; and in 1000 of these the diagnosis was later checked by histological examination of tissue removed at operation. Among the 40 proved cases of cancer of the cervix there were 39 positive vaginal smears and 1 false negative; among 18 cases of cancer of the fundus there were 15 positive smears and 3 false negatives; and in each of 2 vaginal cancers the smear was positive. In the remaining 940 cases, where the diagnosis of cancer was eventually excluded, there were 11 positive smears. Thus the total combined error from the false negative and false positive smears amounted to only 1·5%. To achieve such accuracy the staff had to be carefully trained. Examination of the average smear took about twenty minutes, but up to two hours might be spent on a particularly difficult one. FREMONT-SMITH and his

1. Papanicolaou, G. N., Traut, H. F. Diagnosis of Uterine Cancer by Vaginal Smear. New York, 1943.
2. Isbell, N. P., Jewett, J. F., Allan, M. S., Hortig, A. T. *Amer. J. Obstet. Gynec.* 1947, **54**, 576.

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associates [3] have reported on 12 cases of early cervical carcinoma, in 10 of which vaginal smears were positive. Biopsy, undertaken in 9 cases, confirmed the diagnosis in only 3, but in the remainder the diagnosis was confirmed when the tissues removed at operation were examined histologically. The original technique has been usefully modified by HUNTER and RICHARDSON.[4]

Only extensive trial can establish the value and limitations of this technique, and there is a risk that the many difficulties in the interpretation of results may bring it undeserved discredit. As GATES and WARREN [5] point out, good, bad, and indifferent results may be obtained by different people following the same directions; each worker must set up his own criteria. Since the malignant potentialities of cells are identified by relative rather than absolute changes in structure, fine shades of difference separating benign, atypical, and malignant phases must be recognised. It is well to remember that indications of malignancy, though they may be obvious and reliable in the nucleus, can never by themselves be of diagnostic significance in the cytoplasm. GATES and WARREN suggest that malignant cells are often more easily detected in smears than in sections of tissue; and the difficulty of the occasional misleading smear can be overcome by repeating the test. They claim that with obscure or borderline conditions, such as atypical hyperplasia of squamous epithelium of the cervix, the vaginal-smear method is particularly valuable in identifying the sequence of changes in the metamorphosis of benign into malignant cells. The method is also likely to prove of great importance in assessing the response of cancer cells to irradiation, both as regards initial response and subsequent recurrence.

PAPANICOLAOU'S latest work [6] suggests that this method may be usefully extended to the diagnosis of cancer of the bronchus, stomach, bladder, and kidney. Indeed, it seems that it should be applicable to cancer involving or communicating with any body cavity. In bronchial cancer he reports positive results in 22 out of 25 cases; and in several the test furnished the first indication of malignancy. WOOLNER and MCDONALD [7] have confirmed that in bronchial carcinoma this is a useful adjuvant to other procedures; and it is especially convenient where bronchoscopy is contra-indicated. The result was positive in at least 80% of their cases. One disadvantage is that it gives no clue to the site of the tumour; and in this respect examination of bronchial secretion is preferable. Also at the Mayo Clinic, DAUT and MCDONALD [8] have studied the diagnosis of malignant lesions of the urinary tract by the smear technique; out of 40 cases, 19 were positive and each was verified by biopsy. In genito-urinary practice the method is likely to be most useful for screening cases of obscure hæmaturia and in the investigation of lesions of the renal pelves or calices detected by excretory urography.

3. Fremont-Smith, M., Graham, R. M., Meigs, J. V. *New Engl. J. Med.* 1947, **237**, 302.
4. Hunter, W. C., Richardson, H. L. *Surg. Gynec. Obstet.* 1947, **85**, 275.
5. Gates, O., Warren, S. Handbook for Diagnosis of Cancer of Uterus by Use of Vaginal Smears. Cambridge, Mass., 1947.
6. Papanicolaou, G. N. *J. Amer. med. Ass.* 1946, **131**, 372.
7. Woolner, L. B., McDonald, J. R. *Proc. Mayo Clin.* 1947, **22**, 369.
8. Daut, R. V., McDonald, J. R. *Ibid*, p. 382.

Aims of Medicine

ORIGINALLY medicine was a purely curative art. In the relief of suffering the doctor's obligations were to his patient alone; and the personal relationship between them, expressed in the Hippocratic oath, is still the basis of medical ethics. But gradually it came to be realised that some diseases could be avoided by the application of rules, and from this arose the first ideas of preventive medicine and medical responsibility to the community. Even in the Middle Ages considerable successes were achieved by segregating the sick and by the use of quarantine. The real development of "public health," however, had to wait for advances in knowledge and the awakening of a social conscience. It was the appalling conditions of the industrial revolution in England, and recognition of the bacterial origin of many diseases, that chiefly led to the adoption of a new aim in the practice of medicine, in which the stress was laid on prevention rather than cure. From this time the need to protect the community was emphasised, and there was a shift of interest from the individual to the environment.

The successes of environmental medicine have of course been immense. Yet the fact remains that the prevention of disease by perfect control of environment is an impossible ideal for a naturally enterprising and migratory animal: if man's activities in the past had been limited by the necessity of a controlled environment, human progress would have been immeasurably retarded or even made impossible. The late J. S. HALDANE observed that "the characteristic mutual relations between organism and environment are those of stimulus and response," and in order to raise the standard of health medicine should try to enable the individual to respond sufficiently to maintain the fullest functional activity over a wide range of external conditions. On this view the emphasis of preventive medicine should be less on the environment than on the individual: the human being, with his potentialities for resisting and overcoming adversity, should not be regarded as something to be shielded from possible harm, but rather as a living dynamic organism to be further developed and raised to higher levels of functional perfection. Excessive concentration on the avoidance of danger is apt, it may be said, to produce a negative outlook on life, and a withdrawal from contacts which might conceivably result in disease; and where such a policy of "safety first" is carried too far it may be fatal to the progress of mankind—physical, mental, and social alike. The normal healthy person has great powers of actively resisting adverse conditions: he may actually be stimulated to greater health, both mental and physical, by withstanding them. But such powers are maintained only by frequent exercise: the athlete or skilled craftsman must practise to preserve physical efficiency; mental effort is equally necessary to keep the mind keen; and active immunisation against bacterial infection must be repeated at intervals if resistance is to be sustained. In each of these spheres forces are brought into play, or exercised, in order that environmental difficulties can be more easily overcome and in order that the person can lead a healthier or more satisfactory life. According to this argument, if health is the ultimate goal our principal

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aim should be to fit the individual for an active, motile, and varied life.

This emphasis on individual fitness as the chief aim of medical work seems, however, to pay too little attention to the advantages of a sheltered environment. On the whole, is it not preferable to live in a country from which plague and cholera and typhus have been banished? Danger is no doubt stimulating, but where people or nations have to be continually on guard against it they devote to mere defence much of the energy that would otherwise go into development. Do we not, indeed, owe man's progress to the shelter given to individuals by social life?

> "The fundamental biological meaning of gregariousness," said WILFRED TROTTER, "is that it allows of an indefinite enlargement of the unit upon which the undifferentiated influence of natural selection is allowed to act, so that the individual merged in the larger unit is shielded from the immediate effects of natural selection and is exposed directly only to the special form of selection which obtains within the new unit. There seems little doubt that this sheltering of the individual allows him to vary and to undergo modifications with a freedom which would have been dangerous to him as an isolated being, but is safe under the new conditions and valuable to the new unit of which he is now a part." [1]

The people to whom medicine ministers are individuals but also members of human society, and their affairs must always be considered in relation to those of others. "All human psychology . . . must be the psychology of associated man, since man as a solitary animal is unknown to us, and every individual must present the characteristic reactions of the social animal. . . ." [1] It is true that groups have no existence apart from the individuals of which they are composed; and the doctor's duty is to serve those individuals. But he cannot do so properly if he looks on them purely as separate persons; for it is increasingly obvious that their failure to thrive, or their disease, is very often a result of inability to reconcile their separate selves to social life. No doubt excessive emphasis on the claims of society might reduce the doctor's regard for the individual; and it was with this in mind that we suggested [2] that it might be best for social medicine to grow out of hospital medicine rather than from traditional public health. This suggestion, however, did less than justice to a service which for generations has been aware of some of the problems that outsiders are now rediscovering; and the truth is that Prof. JOHN RYLE'S "social pathology" requires to be developed from both sides—by the clinician, with his eye on the individual, and the sanitarian, with his eye on the community.

Curative medicine is necessary; preventive medicine is necessary; functional medicine (or the pursuit of positive health) is necessary: we need the best possible care for the individual if he is to be strong and have his life abundantly, and we need medical care of the group in the interest of its members. But each of these kinds of practice can be improved by the study of social relationships. The conjoint aim of medicine is to improve environment and to enable the individual to cope with it, and nowadays the environmental factor which causes many people most trouble is the behaviour of other human beings.

1. Instincts of the Herd in Peace and War. London, 1922.
2. *Lancet*, 1947, i, 413.

Annotations

BOVINE PLASMA

SINCE we last discussed bovine plasma [1] the work of Massons [2] has been further investigated in Czechoslovakia by Mělka, Rapant, and Zapletal [3]; and our present issue contains a paper by Boesen, Larsen, and Nielsen in Denmark, and a letter from Barsoum in Egypt. Though the accounts by the Czechoslovak and Egyptian workers represent denatured calf plasma (D.C.P.), prepared by Massons's method, as a harmless and satisfactory substitute for human plasma, the continuing need for caution is emphasised by the report from Denmark. Boesen and his colleagues show that, if bovine serum denatured by Massons's method is not to produce anaphylaxis in the guineapig, it must be treated so intensively that the colloid osmotic pressure is reduced by more than half. If, like Massons, they had heated their serum to 100°C, the colloid osmotic pressure would have fallen even lower; indeed, Edwards [4] said that exposure of formolised ox serum to this temperature destroys its osmotic pressure completely. Mělka and his associates, on the other hand, found that the "denaturing process of Massons does not reduce the colloid osmotic pressure of the D.C.P. proteins." The point is important, for the value of any plasma or serum substitute depends partly upon the osmotic pressure it exerts, and if the osmotic pressure of D.C.P. is finally shown to be reduced or destroyed, its value as a plasma substitute will be questionable. The Danish workers also note that their serum still evinced toxic and antigenic properties when given to rabbits, and say that Bing was unable to render formolised bovine serum non-antigenic even by submitting it to more rigorous treatment than their own material received.

Massons and Edwards [5] explain differently the destruction of the antigenic properties of bovine plasma and serum by formaldehyde and heat. Massons holds that the active agent is formaldehyde, though heat accelerates the reaction and sterilises the material; ammonia is unnecessary but prevents cloudiness and pain on injection. Edwards attributes the despeciation to the heat; the formaldehyde and ammonia are added to prevent coagulation, excess formaldehyde being converted by the ammonia to hexamine. Horsfall [6] and Jacobs and Sommers [7] showed that the sera of several mammalian and avian species, more strongly formolised than in the methods of Massons and Edwards, retain the power of evoking antibodies, and it therefore seems likely that Edwards's explanation is the correct one. The rôle of ammonia in converting excess formaldehyde to hexamine is possibly important in another direction, and the suggestion by Massons that its addition "is not absolutely necessary" should be regarded with reserve, since Horsfall [6] showed that rabbits injected with formolised rabbit serum (in the preparation of which no attempt was made to remove excess formaldehyde) gradually developed a skin sensitiveness to formaldehyde in dilutions up to 1 : 500,000. Horsfall [8] also showed that intradermal injection of formolised serum proteins containing no uncombined formaldehyde produces skin reactions in persons sensitive to formaldehyde, but he did not study the intravenous injection of formolised proteins in such persons.

The work done in America during the war on bovine albumin prepared by the method of Cohn and Hughes

1. *Lancet*, 1946, ii, 355.
2. Massons, J. M. *Ibid*, p. 341; Introduction al Estudio de la Plasmoterapia. Barcelona, 1947.
3. Mělka, J., Rapant, V., Zapletal, B. *Lancet*, 1947, ii, 382.
4. Edwards, F. R. *Ibid*, 1946, ii, 437.
5. Edwards, F. R. *Brit. med. J.* 1944, i, 73.
6. Horsfall, F. L. *J. Immunol.* 1934, 27, 553.
7. Jacobs, J. L., Sommers, S. C. *Ibid*, 1939, 36, 531.
8. Horsfall, F. L. *Ibid*, 1934, 27, 569.

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has not yet been fully described. According to a brief report [9] on 60 volunteers given 25 g. of bovine albumin intravenously, 24 developed an illness characterised by: (1) a long incubation period (10–33 days); (2) variation in severity from a very mild to a protracted form with high fever lasting 4–6 weeks; and (3) sometimes purpura, signs of hepatic and renal damage, and cardiac symptoms with electrocardiographic changes. There was 1 death.

Thus it still has to be proved that bovine plasma or serum is as harmless and as effective as human plasma. It is to be hoped that the laboratory and clinical protocols of the Czechoslovak workers, the hæmatological and biochemical studies mentioned by Edwards in 1944 and fuller particulars of the 200 cases he mentioned in 1946, and the work of Bing will soon be published. Meanwhile, the verdict on bovine transfusion fluids must remain in suspense.

ŒDEMAS AND ANÆMIAS OF MALNUTRITION

THE classical explanations of clinical phenomena totter and fall with alarming frequency. Cardiac œdema used to be attributed to capillary damage through anoxæmia but has now been shown to result from diminished renal excretion of water and salt.[10] Famine œdema was widely ascribed to a low plasma-protein level causing low colloid osmotic pressure and therefore, according to Starling's views, filtration from capillaries. Iron-deficiency anæmia is complicated by the non-availability of most of the dietary iron; and macrocytic anæmias have to be interpreted in terms of Castle's extrinsic factor, Wills's factor, and folic acid.[11] The haze surrounding nutritional œdema was much in evidence at the Liége International Congress in October, 1946. Govaerts,[12] on the basis of war-time experience in Belgium, favoured low colloid osmotic pressure with slightly low plasma protein and circulatory inadequacy as the cause. Gounelle [13] had studied cases in Paris which led him to believe that pituitary deficiency played a major part. Sinclair,[14] who reported on the investigations of the Oxford Nutrition Survey in Holland and Germany, laid stress on the delayed water diuresis in the upright posture, the increased diuresis when lying down, the decreased excretion of administered salt, and the normal level of plasma proteins. Simonart [15] believed the cases seen in Belgium were caused by deficiency of thiamine.

When these questions were discussed by the experimental medicine section of the Royal Society of Medicine on Feb. 10, Dr. H. M. Sinclair divided nutritional œdema into wet beriberi and hypoproteinæmic and famine œdemas. The first is clinically distinct from the other two; the second may be a late stage of the third. Famine œdema is usually but not exclusively found in people who have subsisted on a diet low in protein of high biological value; similarly, their calorie intake is usually low but may be normal, and wasting is not an invariable finding. By an analysis of clinical, dietary, and biochemical studies on 3500 subjects in Holland in May and June, 1945, and on 62,250 subjects in Germany subsequently — done for public-health purposes — he showed that there is no significant difference in the levels of serum protein, serum albumin, serum cystine, various inorganic ions, hæmoglobin, and other substances found in cases of famine œdema, of other œdemas, or in people with no œdema. The colloid osmotic pressure is slightly reduced in famine œdema, and it is lower than the pressure calculated from Govaerts's equation; however, the cause of the œdema is not lowered colloid osmotic pressure. Sinclair said that close agreement was found between estimations of serum protein by gravimetric, densitometric, biuret, and microkjeldahl methods; but comparison of the first and last showed that the nitrogen content of serum protein in cases of famine œdema is significantly lowered, proving that there is a qualitative change in the protein. Five different lines of investigation have shown that deficiency of thiamine is of no causal significance in famine œdema; and it is not caused by circulatory failure or by increased permeability of capillaries to protein. Sinclair discussed nycturia, which is common in undernourished people, in terms of the diminished response of such people to Volhard's water test when standing (shown by Govaerts) and the increased response when lying. In normal people there is diminished water diuresis in the erect posture, possibly because the renal cortical shunt of Trueta and others is brought into action; this diminished water diuresis when standing is intensified in famine œdema, and Sinclair suggested that reabsorption of water in the juxtamedullary nephrons may be increased by arteriolar constriction producing the shunt, and that acrocyanosis may be explained by a similar shunt with arteriolar constriction in the skin. He also discussed the possible significance of the adrenals, which are usually hypertrophic in famine œdema but not in simple fasting in adults or in undernourishment in children; further, in pigeons McCarrison has demonstrated a well-marked adrenal hypertrophy in wet beriberi but not in dry beriberi.

Speaking of nutritional anæmia, Dr. Martin Hynes dealt in turn with deficiency of iron, protein, Castle's extrinsic factor, and Wills's factor. In his view the members of the vitamin-B complex have not been shown to play any part in these anæmias in man, with the possible exception of folic acid. He investigated 1400 Indian soldiers on the North-West Frontier, of whom 64% had hypochromic anæmia easily cured by iron; their dietary iron was high (65 mg. per day), but only 2–3 mg. daily was absorbed from the gut. He maintained that infections associated with malnutrition are more important than protein deficiency itself in causing nutritional anæmia, but protein—particularly meat rather than milk—is very important in treatment. Nutritional macrocytic anæmia can be cured with 'Marmite,' whereas pernicious anæmia cannot; the former is associated with lack of animal protein, and pregnancy and malaria are common precipitating factors. It is not yet clear whether the anæmia of sprue is caused by deficiency of Castle's factor or of Wills's factor or of both, and the value of folic acid is difficult to assess.

In the discussion, Dr. R. B. Hawes defined beriberi as a disease occurring in rice-eating people taking more than 3000 calories daily with carbohydrate providing more than 66% of the total calories. He has found egg-yolk very efficacious in the treatment of tropical macrocytic anæmia. Dr. D. J. C. Cunningham described observations made with Dr. Sinclair in Germany: in œdematous men in a civil internment camp there was a significant increase in the night excretion of water and also of solids, and the specific gravity of the urine fell throughout the night; there was no correlation between nycturia or œdema on the one hand and hypotension or bradycardia on the other. Dr. S. E. Dicker found increased extracellular fluid in rats subsisting on a protein-deficient diet for seven days; there was no fall in serum protein or in colloid osmotic pressure, but there was a diminished water diuresis. Dr. J. A. Manifold suggested that the Wills factor is probably folic acid. Prof. H. P. Himsworth, from the chair, suggested that the findings of Sinclair and Cunningham could be explained if in undernourishment there is failure to destroy the antidiuretic hormone of the posterior lobe of the pituitary, as happens in cirrhosis of the liver.

9. Heyl, J. T., Janeway, C. A. *J. clin. Invest.* 1947, **26**, 1185.
10. Warren, J. V., Stead, E. A. jun. *Arch. intern. Med.* 1944, **73**, 138. Merrill, A. J. *J. clin. Invest.* 1946, **25**, 389.
11. See leading article, *Lancet*, Feb. 14, p. 251.
12. Govaerts, P. Enseignements de la Guerre 1939–1945 dans le Domaine de la Nutrition. Liége, 1947; p. 23.
13. Gounelle, H. *Ibid*, p. 66.
14. Sinclair, H. M. *Ibid*, p. 75.
15. Simonart, E. F. *Ibid*, p. 105.

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The lively discussion at this meeting showed that these nutritional problems are being widely investigated, and that the recent advances in the biochemistry of nutrition are being actively applied in clinical medicine.

A FAMILY WELFARE SERVICE

FOR those who like the idea of a growing population the prospects are brighter. The birth-rate in 1947—20·5 per 1000 population—was higher than in any year since 1921, and 38,000 more babies were born than in the earlier year. Nevertheless P.E.P.[1] feel that inducements to have children are not very great just now, and that the present rise will not be maintained unless a conscious policy to encourage parenthood is devised and followed. Family allowances have done a little, but there is a strong case, P.E.P. think, for raising the allowance from 5*s*. to 10*s*. a week for every child after the first. Their report glances, not enthusiastically, at the idea of allowances rising with the income of the parents; but they suggest that it might be possible to give tax rebates proportional to income, independent of the rate of tax.

At present to get the full allowance of £27 for a child the taxpayer must have an income of more than £125 clear of all deductions. Thus parents with an income of £400 a year get £27 for the first child; but the reduced rates cut the value of relief for the second child to £23 5*s*., and for the third to £16 10*s*. A rebate fixed at, say, 50% per child would allow the parents to count on an unchanging sum for each child; though it is noteworthy that in this case the parents would only recover £60 for three children instead of £66 15*s*.

They also recommend the introduction of low-interest marriage loans to enable young people to set up house, as soon as sufficient furniture and household appliances are available for them to buy. Meanwhile, they think maternity grants for the first baby should be raised from £4 to £15, and that special dockets should be issued to pregnant women for the purchase of "utility" baby-outfits.

To promote happy and successful family life, we need, they say, a Family Welfare Service, which would provide for free health examination before marriage, and for eugenic advice, marriage guidance, advice on birth control, and the treatment of involuntary childlessness. Medical examination before marriage would, they believe, be voluntarily sought on a wide scale if its importance for the welfare of the family was given good publicity, and if it was available gratis or at a low cost. Marriage guidance would also be a part of the service, which should itself be within the National Health Service—a proposal at variance with that of the Denning Committee on Matrimonial Causes, which held that a marriage welfare service should be sponsored by the State but should not be a State institution. To offer birth-control information, and advice on sound family planning, would be one of the duties of the Family Health Service, as well as advice on subfertility. The dissemination of contraceptive knowledge "presents society with a challenge to create social and economic conditions and a general atmosphere favourable to parenthood."

ACTIVE SPLENIC EXTRACTS

ATTEMPTS to prepare physiologically active extracts from the spleen have hitherto not been very convincing, and the isolation of two more such substances, assayed mainly by their effect on the bleeding-time in rats and guineapigs, may not at first sight seem important. However, Ungar's review [2] of his work on splenic extracts shows that in his hands the bleeding-time can be a reliable measure of biological activity and that the two compounds which he has isolated are of considerable interest.

The first substance, "splenin A," is formed in vitro in a medium containing ascorbic acid and splenic tissue. The pure substance, of probable formula $C_{18}H_{40}O_5$, is active in extraordinary dilutions (1×10^{-9} mg. per ml.) and when injected into a guineapig or rat reduces the bleeding-time and decreases capillary permeability; it also reduces the susceptibility of the red cells to lysis by a hæmolysin-complement system and increases the rate of association between trypsin and serum anti-protease. This substance, which is made exclusively by the spleen, is controlled by a chain of endocrine reactions passing from the pituitary through the adrenal cortex to the spleen. The blood-level of splenin A, demonstrated by its effect on the bleeding-time when injected into normal rats or guineapigs, rises after trauma. This effect does not occur if the animal experimented on has previously been submitted to hypophysectomy, adrenalectomy, or splenectomy. The injection of pituitary extracts will raise the blood-level of splenin A if the adrenals and spleen are present; adrenal extracts are active if the spleen is in situ, but only splenic extracts are effective after splenectomy. Ungar suggests that an increase in splenin A may be part of the general response of the organism to damaging stimuli described by Selye.[3] But splenin A apparently does not influence the course of this response, for though its injection before trauma prevents the appearance of disseminated hæmorrhagic lesions it does not alter the mortality-rate.

"Splenin B," whose effects are exactly opposed to those of splenin A, is formed in the spleen and bone-marrow and estimated by its power to lengthen the bleeding-time; it is absent from normal blood but large amounts can be demonstrated in scurvy, various hæmorrhagic and hæmolytic syndromes, acute rheumatism, and thyroid deficiency. Extracts from the spleen in experimental vitamin-C deficiency show a progressive decrease in splenin A and a parallel increase in splenin B. This, together with the fact that ascorbic acid can prevent the formation of splenin B, which occurs in vitro when splenic tissue is incubated with glycogen, suggests a normal balance in the formation of these substances. Although the injection of splenin B does not produce hæmorrhagic or hæmolytic disease it is tempting to associate the beneficial effects of splenectomy in hæmolytic anæmia and thrombocytopenic purpura with the removal of a potent source of this substance.

STUDENT HEALTH

THE drive for a comprehensive student health service [4] gains new impetus from a report by the health committee of the National Union of Students. Among 38 universities or university colleges, 57 training colleges, and 33 technical colleges, 42% require no medical examination or certificate on entry, 30% offer no advisory or remedial service, 36% have no arrangement for calling a medical officer, 39% do nothing about lodgings, and 69% make no provision against tuberculosis. The position at technical colleges is described as appalling: "the health of students in these institutions appears to be a matter of complete indifference to the authorities." The committee recommends periodic compulsory medical examination; treatment, however, should be voluntary. Full-time medical officers should be appointed; and small institutions might share the services of a single officer. Food and accommodation should be supervised. As regards physical training there should be swimming-baths, squash and tennis courts, and gymnasia "which many can enjoy without attaining expert status."

THE INDEX and title-page to Vol. II, 1947, which was completed with THE LANCET of Dec. 27, is now in preparation. A copy will be sent gratis to subscribers on receipt of a postcard addressed to the Manager of THE LANCET, 7, Adam Street, Adelphi, W.C.2. Subscribers who have not already indicated their desire to receive indexes regularly as published should do so now.

1. *Planning*, 1948, **14**, no. 278. From Political and Economic Planning, 16, Queen Anne's Gate, London, S.W.1.
2. Ungar, G. *J. Physiol. Path. gén.* 1947, **39**, 219.
3. Selye, H. *J. clin. Endocrinol.* 1946, **6**, 117.
4. See *Lancet*, 1947, ii, 949.

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Special Articles

PLASTIC SURGERY IN YUGOSLAVIA

THE history of the UNRRA plastic-surgery units in Belgrade is the story of the introduction of plastic surgery and its associated special dental, anæsthetic, and nursing techniques into Yugoslavia between November, 1945, and January, 1947.

Preliminary discussions on the rôle of UNRRA relief services in the treatment of Yugoslav war-wounded took place in the spring of 1945, while the country was still partly under German occupation and the UNRRA Yugoslav mission was still in Italy. Sir Harold Gillies visited Belgrade at the request of UNRRA and of the Yugoslav medical authorities, and reported to the director of UNRRA health services in London that there were very many war casualties with injuries amenable to plastic repair but no facilities for their treatment.

It was therefore agreed that a hospital should be set aside in Belgrade for these patients, and that Yugoslav surgeons, anæsthetists, dental surgeons, and nurses should be trained there, the male teaching personnel being supplied from the E.M.S. plastic units.

The first team arrived in Belgrade on Nov. 4, 1945, as a completely self-contained unit of surgeon, anæsthetist, dental surgeon, theatre sister, ward sister, secretary, dental mechanic, and theatre technician. The first operation was performed on Nov. 13. The last member of the fourth team left Belgrade on Jan. 20, 1947, leaving the hospital and its staff equipped with the knowledge to continue unaided the development of plastic surgery and its associated specialties in Yugoslavia.

BEOGRADSKI TRGOVACKE HOSPITAL

This hospital was allocated by the Yugoslav medical authorities for the treatment of maxillofacial and plastic-surgery patients, both civil and military, and for the training of Yugoslav doctors and nurses by the UNRRA teams. It had been built about ten years before the war by a guild of city merchants for the sick and elderly members of the guild, and had been undamaged, except for the loss of windows.

The hospital is about $2^1/_2$ miles from the centre of Belgrade, on the outskirts of the city but within about a mile of the main aggregation of the buildings of the university hospital and of the civil and military hospitals. The design is modern; there are three floors, a good operating-theatre capable of working two tables simultaneously, a lift to the theatre, and a maximum of 150 beds. The wards are small, containing not more than 6 beds and many only 2. Though this arrangement added to the already considerable nursing difficulties, it had advantages in a hospital for plastic surgery because infection could be controlled to some extent by segregation. Dressing-rooms and bathrooms on each floor proved adequate for the treatment of ambulant patients; but those confined to bed had to have their dressings changed in the wards, owing to the absence of wheeled beds. This unsatisfactory state of affairs could only be condoned because in a hospital for plastic surgery a small proportion of the patients are confined to bed at any one time. Fortunately, the number of cases of recent burns treated was small.

A feature of the hospital was the large apsidal recreation-rooms at the south-western end of each floor, the convex walls of these rooms being entirely of glass. These rooms were most useful in spring, summer, and autumn; in winter it was impossible to heat them sufficiently and recreation facilities for the patients were somewhat limited.

The heating of a hospital in Belgrade must inevitably be a problem, since temperatures of −25°C are not uncommon and are likely to be accompanied by the Koshova, a penetrating north-easterly wind. Double windows and central heating are the rule in the city, but glass to replace that lost during the war is scarce, and owing to transport difficulties the supply of wood and coal is limited. During the winters of 1945–46 and 1946–47 great difficulty was experienced in maintaining the operating-theatre at a temperature at which surgery was safe, and operation lists had sometimes to be abandoned for this reason. The English staff were in some discomfort during these periods despite multiple layers of garments. Hot coffee, laced with the local Vodka, between operations, did much to maintain morale and the metabolic rate.

Small departments of radiological diagnosis, bacteriology, and physiotherapy were maintained in the hospital, the medical officers in charge visiting from other hospitals in Belgrade. The shortage of doctors, particularly of specialists, made full-time appointments impracticable.

METHODS OF TEACHING

The introduction of a new branch of surgery made it necessary to educate the Yugoslav hospital staff, doctors outside the hospital, and the general public. Education of the general public is particularly important in a country whose medical services are so scattered and so little organised. This policy was justified by the high proportion of patients who attended the hospital on their own initiative, often from remote parts of the country.

The training of the Yugoslav hospital staff followed the usual practice in England. A method was first demonstrated and then performed by the trainee with the assistance of the tutor; ultimately the more senior members of the Yugoslav staff were made responsible for training their less experienced colleagues. Thanks to the willingness with which all accepted our occasional criticisms of their methods or techniques, a satisfactory coöperation existed between the English and Yugoslav staffs despite the differences of language, ideology, and background.

Besides the usual methods of training, the English staff of the various UNRRA teams spent much time in the outpatient sessions held every afternoon. At these sessions we got some insight into the social conditions in the villages and country remote from the big towns.

The extraordinary poverty was notable; many peasants had travelled for two or three days in open carts or horse-drawn sleighs, the children in rags and covered for their journey with straw and hand-woven rugs which seemed poor protection against the biting north-east wind and a temperature of −25° or −30°C. The results of starvation, German occupation, and an inadequate medical service were daily brought to one's notice. On occasion starvation and the attendant shadow of typhus have been responsible for almost unbelievable losses of the facial soft tissues and skeleton, often in children so undersized that one could justifiably mistake a child of 8 for one of 4 years of age.

The instruction of the medical profession as a whole in the possible fields of usefulness of the newly established specialty was not in any way a labour, since the staffs of the hospitals of the area not only showed us the traditional Yugoslav hospitality but were delighted to discuss common problems and invite members of the teams to give demonstrations in their hospitals. Since the war, there has been a great growth of interest in the medical practices of the English-speaking countries, an interest which remains unsatisfied because of difficulties in arranging distribution of, and payment for, publications from this country and America.

Besides the visits of the English staff to the hospitals of Belgrade, a few visits have been made to hospitals in other Yugoslav cities. Such tours were always difficult because of the bad road conditions and the wholesale destruction of bridges, rolling stock, and railway lines during the war. Visitors came to the hospital from all parts of the country, many of them travelling at their own expense to spend part of their annual holiday in this way. We could receive no greater compliment than this from the members of a State medical service characterised by its poor salaries and inadequate leave.

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The language difficulty did not present the obstacle to teaching that might have been expected. Partly because of the short period of service of any given member of the UNRRA teams, and partly because of the intrinsic difficulty of Serbo-Croat, most teaching in the hospital was done through an interpreter. Two interpreters, Yugoslav girls, were attached to the hospital; both spoke at least three languages besides English and Serbo-Croat, and both showed an astonishing ability in adapting technical words and phrases for which there was no Serbo-Croat equivalent. Further, they acquired an understanding of the purpose of plastic surgery and an appreciation of the mental attitude of the English staffs which made free phrase translation possible, in contrast to the laborious method of word translation. What success we have achieved is in no small measure due to the skill of these girls.

EQUIPMENT AND SUPPLIES

Owing to the wholesale destruction of medical equipment by the retreating enemy it was necessary to import all the equipment, both specialised and general, before work could be begun. Much of this had been obtained by UNRRA from ex-R.A.M.C. stores. It was dispatched by air and sea from England. Part of the initial equipment of the first team arrived in Belgrade nearly thirteen months overdue, having apparently toured most of Europe. Nevertheless, by the time the first team reached Belgrade, enough supplies had arrived to allow work to begin on a limited scale; and, supported by further supplies, ingenuity, and substitution, the work developed satisfactorily.

With the return of more normal conditions many of the routine consumable stores could be obtained in Belgrade, but all specialised material, particularly anæsthetic gases, had to be sent from England. This long-distance ordering was complicated by the difficulties of purchase in England and by the irregularities of transport.

RESULTS

Surgical Department

Two Yugoslav surgeons are now sufficiently trained to continue the training of their compatriots and to be responsible for the further development of plastic surgery in Yugoslavia. We were fortunate in acquiring these excellent candidates for training; both had had a good general surgical training before the war and experience of war surgery with the partisan army, and both rapidly developed the mental outlook and technical care essential for the plastic surgeon. Both of these surgeons had been attached to the hospital since its inception.

Five other surgeons have been attached to the hospital for periods of 4–10 months. Of these, one was transferred to Zagreb, the capital of Croatia, and is responsible for plastic surgery in a general surgical department of one of the large clinics. Of the remaining four it is too early to say which will continue with plastic surgery as a specialty. Besides these, who have been more or less permanently attached to the hospital, we have enjoyed a large audience among the surgeons of the country, who have attended the hospital for various periods as visitors. The steadily increasing number of cases referred from all over the country is evidence of the success of this proselytising.

Throughout the fifteen months of the period under review an English surgeon was attached to the hospital.

Anæsthetic Department

This has been a most successful venture. A great demand for and interest in general anæsthesia have been created among the surgeons of Belgrade and elsewhere, while the specialty has been established on a sound basis and is extending rapidly, though not quickly enough to meet the demand. This is inevitable, since the three anæsthetists responsible for the training programme rightly refused to sacrifice quality to quantity.

The anæsthetists attached to the first three plastic-surgery teams trained one full-time specialist anæsthetist, the first in Yugoslavia; one full-time anæsthetist, who has been studying in England with a British Council scholarship; and two part-time anæsthetists. After the last British anæsthetist returned to England in November, 1946, two new candidates for training were accepted, and we were much impressed by the quality of the teaching these postgraduates have received from their compatriots.

Though the numbers trained are not impressive at first sight, the wisdom of training a few anæsthetists thoroughly will become more evident later. In a country where there is a small but definite professional bias against modern general anæsthesia the opportunity for criticism must be reduced to a minimum.

Dental Department

Only the first two UNRRA teams had an English dental surgeon working with them. In May, 1946, it was decided that sufficient training had been given to the Yugoslav dental surgeon attached to the hospital to enable him to continue without further assistance. We had found him fully competent to deal with any dental or prosthetic problem which might arise, and since that time he has been responsible for training Yugoslav dental surgeons in the aspects of the specialty required for collaborating with a plastic surgeon. Each of these dental surgeons has his own dental mechanic, the first of these having been trained by the dental mechanic attached to the first team, and the second by his compatriot.

Besides these specialists, three dental surgeons have been attached for various periods to gain experience in the treatment of fractures and similar conditions.

AN AFRIKAANS INSTITUTE FOR PATHOLOGY

THE Union of South Africa already had two English-speaking medical faculties when, some years ago, the Afrikaans-speaking section (60%) of the population started planning a faculty in which the language would be Afrikaans. Through the efforts of its rector, Prof. M. C. Botha, the Pretoria University has now acquired what probably is the youngest medical faculty in the Empire, of which the new "Instituut vir Siektekunde" (Institute for Pathology), illustrated here, forms part. It has cost £150,000 to build and £20,000 to equip, and is under the directorship of the professor of pathology at the new medical faculty, Dr. Adrianus Pijper.

All pathology of Pretoria and environs (teaching, routine examinations, and research) is centred in the institute. Routine specimens come from the general hospital (800 beds) just across the street, at which students receive clinical training. Necropsy material from this hospital is examined in the institute, the necropsies being used for teaching pathological anatomy to students and providing material for the institute's museum, which is gradually being built up, in which task the South African Institute for Medical Research has been a great help.

The staff of the institute, apart from being pathologists to the hospital, are also pathologists to the municipal health department and the local mental hospital. From all these sources, supplemented by specimens from private practitioners, the institute receives quantities of material for teaching, and all these functions place the institute in the centre of medical activities of the town, which has a population of over 150,000 Europeans, Africans, and Indians. Besides the departments already mentioned, there are rooms set aside for taking specimens

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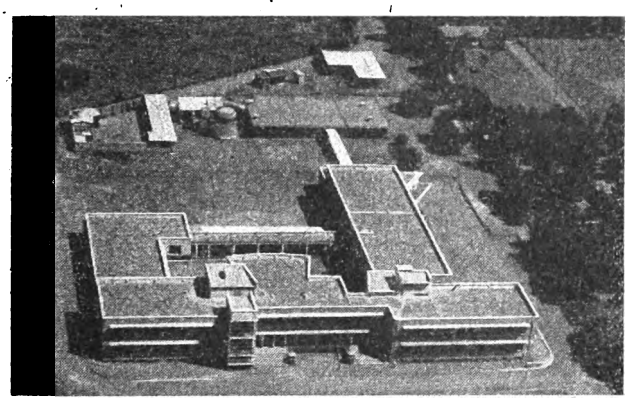
from patients, medicolegal work, teaching public health, and collecting material for teaching tropical and parasitic diseases.

LAYOUT OF THE INSTITUTE

The building is somewhat U-shaped, with a connecting passage between the legs of the U. The legs are laboratories, and the central part is taken up by the students' departments, lecture-room, museum, library, and



Martin Gibbs, Pretoria

The Institute.

administrative offices. Some sections comprise three floors, one of them largely underground. The sections destined for students are separate from the routine and research laboratories, but the students cannot help noting the various activities in pathology that take place in the rest of the building, impressing them with the fact that pathology is a live subject and not just "dead-house" pathology.

The whole of the underground section apart from store-rooms is for necropsies. The post-mortem room itself is built as an amphitheatre, with the usual fittings and ample facilities for inspection by students of organs taken from the body. A refrigeration plant makes it possible to preserve a dozen bodies. Microscopical sections of organs from each necropsy are demonstrated to the students.

The greater part of the building serves the purpose of investigating and teaching conditions in sick people as they exist during life. On the ground floor there is one large lecture theatre seating 130 students. It has an epidiascope and a 16-mm. film projector. The students also have two large classrooms for practical work, each seating 70 students. The institute, notwithstanding war conditions, obtained 170 new microscopes. One of the classrooms is used exclusively for pathological anatomy, and every student not only receives his own set of slides but may use this room at any time that suits him, without supervision. Microscopical specimens are on view in this classroom. The other classroom is used for practical teaching in microbiology and simple biochemistry. As difficulty exists in obtaining textbooks, especially with illustrations, walls and pillars of this room have been covered with illustrations of microbes and apparatus, manifestations of diseases in skin and mucosæ, and similar pictures.

The course in pathology fills the entire third year and overlaps, so far as clinical pathology is concerned, the fourth year, when clinical instruction in the nearby hospital starts. There are about 100 students in each year; it is hoped this number will get less.

The laboratories are all placed in the wings, and they repeat a pattern of one fairly large room used by a lecturer, which connects direct with a much larger room in which two technical assistants are thus under constant supervision. The lecturer's room is equipped as a laboratory, and every lecturer is expected, apart from his teaching duties and supervision of routine investigations, to devote the rest of his time to some research subject. At the back of the building, connected with one of the wings by a covered passage, is a large stable for small laboratory animals. It has an operating-theatre and many small rooms, four of which are arranged for investigating specially dangerous microbes; these rooms have special sewerage and hermetically sealed doors. These doors and the windows can easily be sterilised. Next to the animal house are the gas plant and the "compound" for the native staff of cleaners.

Special features are that all steam sterilising is done in the open on a large South African "stoep" roofed by the floor above. Every room has two horizontal boards fixed flat to the walls all round at a height of about 4 and 5 feet respectively, for putting up shelving or attaching apparatus and notices. A blackboard fixed on the wall near the door serves as a perfect aide-mémoire to the occupants. Right through the laboratory every bench (wall benches and central benches) has an electric wall plug at every 3 ft. and a gas tap at every 6 ft. The town's supply is alternating current; in addition a motor dynamo in an underground room provides several rooms with adjustable direct current. Some of these rooms are intended for photography and photomicrography, and in one it is hoped to have an electron microscope.

Incubators and refrigerators are provided for some of the laboratory rooms only, but every floor has its own large incubating-room and refrigerating-room. Several dark-rooms, all with sluices and their own ventilators, are installed—partly for photography but also for spectroscopy, &c.

Inscriptions have been painted on doors and walls The students' entrance hall has the Hippocratic oath in Afrikaans on its walls—together with Hippocratic aphorisms both in the original Greek and in an Afrikaans translation. Doors carry appropriate quotations in various languages. Six pillars supporting the roof of the lecture theatre carry the names of famous pathologists; it is hoped to add portraits and appropriate pictures all round the building.

* * *

The Pretoria University has made a great effort in establishing this institute. Afrikaans-speaking young men and women can now avail themselves of new opportunities for pathological studies. There is a postgraduate laboratory waiting, and special small laboratories for thesis students have been provided. What is sadly lacking is an adequate supply of books and journals, and a good deal of borrowing has to be done. The American Legation has been very generous in providing journals and pamphlets, but very little has come from other sources. *A bon entendeur demi-mot suffit.*

STAFFING IN THE L.C.C. SERVICE

Dr. R. C. HARKNESS, the outgoing president, delivered his postponed presidential address to the Medical Society of the London County Council Service on Jan. 7, his subject being Medical Staff Problems, Past, Present, and Future.

Dr. Harkness adopted the chronological method, beginning with his personal experience after the first world war as medical superintendent of a municipal hospital in the north, where, with one junior assistant medical officer, he was responsible for some 350 hospital, 150 chronic mental, and some hundreds of "institution" beds. Translated to a metropolitan board of guardians' hospital, he dealt next with the administration of 670 beds with a medical staff of five, three of whom were engaged essentially for district medical work; and he paid tribute to the progressive spirit of his board, to whom, indeed, he had to give the old advice (not without topical application today) to hasten slowly. Great progress had been made by 1930, when the L.C.C. inherited the hospital and institution services of the board of guardians and Metropolitan Asylums Board,

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which, with the mental hospitals service for which it was already responsible, became automatically the largest municipal hospital service in the world. Dr. Harkness became associated with the administration of this service, and he outlined some of its problems. Staffing structure was based on M.A.B. practice, the established (i.e., permanent) staff consisting of medical superintendent, deputy, and senior medical officers. The A.M.O.'s were unestablished, serving up to four years in this grade, when, unless promoted, their appointments ceased. The decision to run all the hospitals as a service was taken very early after the transfer; this, inter alia, facilitated a career in the hospital service. To obviate complaints of hardship, where admittedly good men had not secured posts on the established staff within the requisite four years, a "promotion list" procedure was introduced. At no time however were promotions confined to men on this list—scope was still left for the good junior—and in practice it gave rise to great difficulties.

The introduction of A.M.O.'s class II, in effect of houseman grade, took place in 1932. The consultant scheme—the consultants being strictly what the name implies and not in charge of beds—followed in 1933. The status of the consultant altered in 1937, when, partly to secure recognition of L.C.C. hospitals for D.R.C.O.G. training, &c., half-time consultants were introduced, and in consequence the council's administrative pundits felt that the grade of senior resident obstetrician should, on financial and other grounds, be abolished. This illustrates, incidentally, a problem which medical men engaged solely in clinical work are apt to overlook—the effect which administrative practice in other local and central government departments has on medical administration. Whether acceptable or not, this is inevitable.

The precedent of giving obstetricians and gynæcologists charge of beds was later extended to surgeons and physicians. A L.C.C. departmental committee on medical staffing in 1937–38 recommended further changes, the full implementation of which was prevented by the war. A similar committee appointed in 1946 made further recommendations, many of which are now being actively introduced. Great attention was given to the problem of devising staff structures suitable for functional units in medicine, surgery, pædiatrics, &c. One result has been a great increase in the number of specialist posts in the council's hospitals, but the basic principles on which the medical staffing structure was founded are still retained.

Turning to the future, Dr. Harkness remarked that it remained a field on which no-one could talk with confidence and authority. Salary scales, methods of appointment, size of establishments, equalisation of financial resources among the regions, and many other problems would take a long time to settle. To these general conundrums could be added smaller but more specific ones, such as the staffing of fever and tuberculosis hospitals. Nowhere were there greater variations in size and efficiency and nowhere were staffing difficulties, more particularly in the nursing branches, more pronounced.

Modern Hospitals

VI

HOSPITALS IN SWITZERLAND

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SWITZERLAND is a small country with a population of only 4¼ million; but it lies at the heart of Europe and has an industrious and inventive people. Its professional and technical leaders, bilingual if not multilingual, are by tradition heirs of the learning and participants in the practice of their great neighbours, Germany and France. In the work of hospitals and their planning and construction, leading doctors and architects have in recent years made a study of developments in Scandinavia and know the literature of the United States and the United Kingdom. They seek out what is best in other countries with independence of judgment, and their opinions are worthy of attention.

DISTRIBUTION AND OWNERSHIP

The Swiss Confederation is not strongly centralised. The former sovereign bodies which are thus loosely united—the cantons and half-cantons, 25 in number—with sturdy independence have retained most governmental rights and duties. The federal government has no health services and no hospitals. In its statistical yearbook it does, however, give a summary of the total hospital resources of the country. The last available issue in which the hospital tables are included, that for 1944,[1] shows that in 1942 there were 535 institutions classified as hospitals with 22,000 sick wards containing nearly 64,000 effective patient beds and over 4000 more in reserve. Other tables give the number of sick persons and of days of sickness under cantons and towns, and hospital personnel of different classes. One interesting table classifies the sick wards according to the number of contained patient beds, showing a high proportion of one-bed and two-bed wards.

The Swiss hospitals are owned by the cantons, the communes (cities and towns), and voluntary foundations. The cantons have one or more cantonspitals at the main centres; thus Zürich has a university cantonspital in the city of Zürich (population 380,000) and one other at Winterthür, a neighbouring town of 60,000 population. Out in the country are district hospitals provided by the cantons. The hospitals of the larger towns are independent of the cantonal governments. Voluntary bodies may provide the greater part of the local hospital service; an example of an ancient foundation is the Inselspital at Berne, which now has buildings belonging to the canton and to the city.

Switzerland has 7 universities—3 with instruction in German (Zürich, Basle, and Berne), 3 with instruction in French (Geneva, Lausanne, and Neuchâtel), and 1 bilingual (Fribourg). The first five named have medical faculties, and to foreign visitors the university hospitals make a special appeal since they possess the most comprehensive facilities and are at this time planning important new buildings. The proud tradition of self-sufficiency of the cantons demands that each of the 5 university hospitals is staffed and equipped to deal with all the rarer specialties, including radiotherapy, neurosurgery, and thoracic surgery, although in more populous countries the hospital planner would now restrict these departments to larger populations. The university hospitals and other large hospitals in the bigger towns do, however, serve as hospitals of reference for the people of the cantons which have no large towns and no complete medical centres.

SOME NOTABLE HOSPITALS

The *Bürgerspital, Basle*,[2] has attracted much notice from foreign observers because of its new medical and surgical block, one of the most striking in Europe, which was begun in 1939 and completed in October, 1945. This great building has 650 beds on seven patient floors, for to conserve the garden it was necessary to build upwards; in the judgment of some it is too large for the full play of personal values. Of much interest are other features such as the separate ground-floor kitchen, the system of underground tunnels through which electric motors haul trains of food trolleys from the kitchen to the various blocks, the diet restaurant for outpatients attached to the diet kitchen, and the supply of hot water at 180°C from the city refuse destructor 2 km. distant. The replacement of several other buildings is projected, and when completed the hospital will have about 1050 beds.

The *Zürich University Cantonspital* is another centre of pilgrimage, standing on a site in the city abutting on other important university buildings. Here the newest

1. Annuaire Statistique de la Suisse: Bureau fédéral de Statistique. 1944.

2. *Schweiz. Bauz.* 1946. 127, 191, 203.

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and most interesting building is that for the policlinics [3] for general medicine, ear, nose, and throat diseases, ophthalmology, neurology, and psychiatry. A new medical and surgical ward-block and a ward-block for special departments are projected. The ideas determining the uses and relations of the main buildings and their working-out on the site by addition and replacement are instructive. This has long been a famous Continental hospital.

At *Winterthür* the second Zürich cantonspital now has 400 beds. Here there is an ambitious programme of additions and replacements estimated to cost over 40 million Swiss francs.

The *Inselspital, Berne*, is a fine old hospital of 850 beds; the many separate buildings occupy an extensive site of 129,000 sq. m. The pavilions show the course of hospital planning in Switzerland, for they were erected during three eras—1882–86, 1896–1923, and 1924–36. The recent construction includes a large surgical block and a fine four-story building—the Loryspital—with 120 beds on two floors for the treatment of chronic diseases. A new medical policlinic building is projected.

The *Geneva University Hospital* has main buildings nearly 100 years old. An ad-hoc commission has presented a report [4] describing a number of alternative projects for the extension and replacement of the hospital buildings, which take account of recent experience at Basle and Zürich as well as in foreign countries. An existing feature of interest is a separate division of the hospital in a building off the main site, known as the Hôtel Beau-Séjour. Set in pleasant grounds, this has 250–300 beds and is used both as a recovery hospital and for incurables with rapidly advancing disease; Dr. J.-J. Moser states that it is the first annexe of its kind attached to a major acute hospital in Switzerland.

Other important hospitals of general or special interest could be named, such as the cantonspital at Lucerne, but these examples will suffice to show how actively new buildings are being planned and provided at main medical centres.

PRINCIPLES OF PLANNING

The earlier Swiss hospitals were built by men who were familiar with the German and French practice of the day and who adopted the pavilion style with its number of low buildings, spacious construction, general use of the corridor system, and laterally placed multi-bed wards of varying size and treatment rooms in the ward units. Under German influence the university hospitals were organised in separate "clinics" for medicine, surgery, gynæcology, and pædiatrics, each with its own chemical and biological laboratories—for current work, for research, and to some extent for the teaching of the student.[5]

The older hospital buildings conform to the general Continental pattern. But the better-known hospital planners in Switzerland today—both doctors and architects—are familiar with those trends in hospital planning which find their full expression in America. They are as well-informed on the newer principles of hospital construction as authorities in North America, in Scandinavia, and in this country.

At one end of the gamut of hospital design stands the monoblock of some American city hospitals. At the other end stand the many clinics and supporting buildings in ample grounds characteristic of the older German hospitals, and of hospitals in other countries modelled upon them such as the university hospital at Lünd and the city hospital of Malmö in South Sweden. The Swiss hospital planners dislike the rigidity of the monoblock, but they are sensible of the inconveniences of the full pavilion system. Accordingly, modern hospitals in Switzerland show varying forms between the monoblock and the pavilion systems; and as individualists the Swiss incline towards variety rather than uniformity. They favour a functional and mobile conception of planning with freedom for the hospital to adapt itself to changing needs and to grow, rather than a monumental and static conception.

Dr. Fietz, the architect of the university hospital in Zürich, uses the symbolism of a bunch of grapes to express the ability to grow, the variable form, and yet the unity of the parts which should characterise the buildings of a living hospital. The structure must also reflect the functional arrangement which individualism demands, that authority should be spread amongst a number of professional chiefs so that "each department can be a little empire." Thus they choose to limit strictly the number of beds for which even the major clinical professors are responsible, in that respect preferring the French practice to that in Germany where the professor may have up to 300–400 beds in his department. Rejection of this German habit springs from fundamental dislike of concentration of power determined on logical or ideological grounds, which in the professional world leads to personal friction.

The emphasis in organisation, which is reflected in structure, is on clinical rather than on administrative values. Thus the Swiss hospital planners do not readily accept the weight of argument put forward in America to justify vertical rather than horizontal construction. They reject the claim that vertical transport is more advantageous than horizontal transport; for, although it may be so from the point of view of the business man, they argue that it is not so from the professional point of view. Greater regard is paid to what will help the medical staff to work best for the patients than to what appeals to the hôtelier or hospital accountant as the most efficient method of organisation. More care is given to the arrangements for the medical supervision of the ward than has been customary in North America and in this country. Thus they prefer that each department under one chief should be as far as possible on the one floor for ease of supervision "with the eye." The size of the ward unit should be what one junior doctor can manage—"the spirit of the unit should be of the doctor." Fortunately this is found to be about the same size that is convenient as a nursing unit. In the medical clinics the number of beds would then be about 24; in large hospitals four such units would be supervised by a chief of clinic, and eight would form the whole department under the professor or clinical director.

PLANNING IN PRACTICE

The large hospitals are in the towns, for the Swiss hold that hospitals should be near the people to be served, and if university hospitals then near the university. The towns are not large (the only city with substantially over 100,000 people is Zürich); they are not smoky since electric power is largely used and there is little heavy industry; and they are not so covered with buildings as is common in this country and in North America. The Swiss, as becomes individualists, do not believe in very large hospitals.

The sites of hospitals were at the time of building generally ample, and when modern requirements call for more or greater buildings, they find, as at Zürich, Winterthür, Basle, Berne, and Geneva, that the balance of advantages lies in replacement and extension on the site rather than in building new hospitals farther from the centre. The hospital boards are not deterred by the inconveniences attending replacement, and it seems that the hospitals continue to work without interruption, since in each case the first stage is an extension which can take over the functions of the building next to be demolished, and so on, step by step.

The point of compromise between the dispersion in many pavilions and separate clinics of the old system and the concentration in monoblock or single articulated building of the steel-and-concrete era is consequently in part determined by the position and character of the

3. *Werk*, Nov. 11, 1946.
4. *Bull. tech. Suisse Romande*, Feb. 15, 1947.
5. Flexner, A. Medical Education. London, 1925; p. 211.

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existing buildings that are to be preserved as well as by the physical characters of the site and its surroundings. Thus at Zürich and Basle there will be separate buildings for the main wards (medicine and surgery), the special-department wards, the policlinics, the domestic services, and staff quarters, for the most part linked roughly in quadrangular form; and the same is planned at Winterthür. For Geneva the expert commission, having examined the proposals of eleven different firms of architects under the headings of town planning, functional organisation, arrangement of departments, and architecture, recommend an articulation of buildings in "T" form which fits the site and which is built up of similar main units, each planned with its own outline.[4]

It is a cardinal principle of Swiss hospital planners that a different outline is required by buildings for main wards, for special wards, and for hospital personnel; therefore it follows that they seek to break up the hospital on the horizontal plane into a number of buildings, whether these be separated, or linked around quadrangles, or tied together by a central spine. (The same principle has been worked out by American architects in the vertical plane in such elegant tiered massifs as the Medical Center and the Cornell hospitals in New York City.)

The functional conception of construction is not incompatible with the concentration of engineering services in each building, and a proper regard for standardisation. Standard structural elements, such as were found so serviceable in this country during the war for hutted construction, are much employed. Such elements can serve very varied uses and do not restrict flexibility of design. Standardised service installations and standardised furniture and equipment are all favoured and developed with ingenuity. An example of enterprise in a main engineering service is the heating system of the Zürich university hospital. Heat is abstracted from the river Limmat by a heat pump and conveyed 2 km. to the hospital by water at a temperature of 180°C; a remarkable feature is that it is possible to obtain from the system some three times the heat which is put into it in the form of power to operate the pump.

The ward-blocks are generally designed on the central-corridor system, with patients' rooms on the south and service rooms on the north. Light and ventilation of the corridors are secured by bays between the latter, and some of the construction would satisfy the most fastidious British critic used to large cross-ventilated wards. The largest wards are for 6 or at most 8 patients, and there is a good proportion of smaller rooms. For example, the drawings for the new main ward-block at Winterthür show units of three 6-bed, four 2-bed, and one 1-bed wards, making 27 beds in all. Each unit has its own treatment room and each pair of units a dayroom. The other service rooms are much as in this country. The Swiss do not like plumbing between bedrooms, and the "sub-utility" rooms between small wards of contemporary American practice are not found, nor are automatic bedpan-flushing cabinets commonly installed.

THE POLICLINICS

The policlinics of the university hospitals must interest every visitor who is studying how the investigation and treatment of ambulant patients can be improved, how hospital beds can be protected from needless admissions, and how patients can be spared the "tragedy of hospitalisation"—to use the words of Prof. P. H. Rossier, director of the Zürich medical policlinic.

The policlinic is the clinic of the town (πόλις). (A term with a different etymology—polyclinic—has come into use in the English-speaking countries to describe a place for many (πολύς) people or diseases.) To the policlinics go those townspeople who cannot, or will not, get advice and treatment from private medical practitioners. Historically the policlinic is similar in function to the dispensaries for the sick poor from which treatment may be extended to the homes. At Zürich some 500 persons are still treated each year in their homes from the university policlinic. The work of such a Continental centre may be compared with that of the famous dispensaries in certain of the older American cities, such as that established at Boston in the year 1796 which still retains a much larger domiciliary practice. In this country the outpatient departments of many large city hospitals have provided immediate medical treatment for similar classes of the townspeople, but rarely domiciliary treatment.

The policlinic now performs two other important functions in addition to that of immediate treatment: it serves increasingly as a centre for consultation for patients referred from other departments in the hospital, and for patients sent up by medical practitioners from outside the hospital. There are separate policlinics for the major clinical branches which vary in their relation to the corresponding wards. The medical policlinic is the most important because it deals with the whole range of general medical disorders, has a much more detailed routine for investigation of patients, and is organised as a department separate from the inpatient medical clinic. It may have beds of its own for patients to stay one or two nights to facilitate investigation. The surgical policlinic is much smaller and is close to both casualty department and surgical wards. There are also policlinics for diseases of the ear, nose, and throat, for ophthalmology, and for neurology and psychiatry; these are closely associated in space and functionally with the corresponding inpatient departments. Gynæcology with obstetrics, and pædiatrics have also their own policlinics.

At Zürich the great new policlinic building is of four floors. One whole floor is occupied by the medical policlinic. At one end are the rooms for waiting and routine examination of patients; next come the rooms with laboratories and cubicles for special examinations; then come the director's rooms; and at the other end are the research laboratories. Above is a ward unit of 26 beds, which is an integral part of the medical policlinic. The ear, nose, and throat and eye policlinics, with similar rooms appropriate to their needs are also on upper floors, and connect directly with the wards of the same departments so that the examination and operation suites can be used in common. Below are the neurological and psychiatric policlinics, and rooms for common services including the dispensary, for social workers, and for student teaching.

The medical policlinic is designed for the following operations in sequence: (1) reception and waiting; (2) recording of general particulars, routine examination of urine, and taking of blood for Wassermann reaction and sedimentation-rate by nurses; (3) history-taking and physical examination by a medical officer (acting under the director) who remains thereafter the patient's "doctor"; (4) routine screening of the chest by the patient's "doctor"; (5) special examinations in the hæmatological, bacteriological, physiological, and other laboratories as may be required.

The rooms are arranged compactly and in sequence for ease of circulation so that the patient passes directly to the next person and is not bewildered by being sent distances about a large institution. The waiting-hall, of moderate size, is divided centrally into sections for men and women, and from here the patient passes immediately to the history-taking nurses' room, and thence to one of the 16 medical officers' rooms, 8 on each side, next to which suite is the X-ray screening-room. The laboratories for routine urine and blood tests are in the centre at the end, beyond the waiting-hall and between the two series of medical officers' rooms. These medical officers are men (or women) who have been qualified at least four years and have already had approved hospital training and are, for the most part, going on to be general practitioners. Students in the medical school take no part in the work of the medical policlinic, except that the professor gives systematic teaching on selected patients in the well-equipped lecture hall in the building.

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Professor Rossier states that approximately 90% of the medical patients referred by outside practitioners are fully investigated and diagnosed, and the large majority of these treated without admission to hospital. (Inquiry shows that approximately the same proportion can be dealt with effectively at medical outpatient department in this country, but only in those that are strongly staffed and have the necessary specialist facilities.) The medical policlinic is not organised in separate "specialty" clinics since they seek to treat the patient and not the organ. Should the physician want information only to be obtained by some special procedure (such as bronchoscopy or cystoscopy) he would refer the patient to a member of the staff known to be technically expert at a particular method of examination. Similarly, he would show individual patients to members of the medical team having special interest in such cases. But the general physician would remain in charge and the patient would not be passed to a special cardiological, gastroenterological, diabetic, rheumatic, or other such clinic and thus become detached from the main current of medicine.

Public Health

An Attractive Report

ONE of the complaints that could be brought year after year against most of the annual reports of medical officers of health is that they are dull, uninspiring, and overloaded with figures in the text. In issuing a document which makes no appeal to the public the M.O.H. fails as a rule to make the best use of the powerful weapon in health education that has been placed in his hands.

The report on the health of Barking for the year 1946 is a brilliant exception to this rule. In the introductory letter to his council Dr. Leonard Williams, the M.O.H., says: "The form of my report has been designed to appeal not only to the members of the council, who have an inside knowledge of the working of the services, but also to a wider public." Dr. Williams deserves to succeed; his report is attractively printed and the salient headings are admirably picked out; the illustrations of mothers, clinics, and health services of every kind are well chosen and ought to have great educative value.

The graphs with which the book is illustrated are artless and effective and their lesson is crystal clear. As a supplement to the report Dr. G. S. Wigley, one of the medical officers on the staff, has given the results of an interesting investigation into the duration of breast-feeding in the borough and the reasons for failure. He puts forward a series of important recommendations for improving the present situation.

This report deserves publicity because it is an outstanding contribution to health education.

Transfer of Functions Under Food and Drugs Acts

By the Transfer of Functions (Food and Drugs) Order, 1948, which comes into operation on March 1, the Ministry of Food is to take the place of the Ministry of Health in becoming primarily responsible for the following matters under the Food and Drugs Acts, 1938 and 1944: (1) composition and description of food; (2) food inspection and hygiene generally; (3) the Milk and Dairies Regulations 1926–43, and the Milk (Special Designations) Regulations 1936–46, in relation to distributors and to the heat treatment of milk; and (4) the approval of the terms of appointment, &c., of public analysts. The Ministry of Food also takes over the functions now exercised by the Ministry of Agriculture and Fisheries under sections 33–35 and section 73 of the 1938 Act relating to margarine, &c., and sections 40 and 42 relating to the importation of certain foods.

These changes affect departmental functions only; the duties of local authorities are unaltered.

Poliomyelitis and Polioencephalitis

Notifications in the week ended Feb. 14 were: poliomyelitis 28 (25) and polioencephalitis 4 (6). Figures for the previous week are shown in parentheses. London, Devon, and Kent were the only counties which returned more than 3 cases under the two headings.

In England Now

A Running Commentary by Peripatetic Correspondents

IT was a wise decision of the Nuffield Foundation to establish fellowships in medicine for Dominion graduates who will teach or do research work when they return to their own country. The fellowships are intended to give men the opportunity of working as a member of a university clinical or research team, for by sharing in the work and responsibility of such a team they will come into close contact with the British people and British medicine. The fever of "multiple diplomatosis" is sweeping England just now, but the Foundation discourages diploma-hunting among its fellows. The value of attending lectures, set clinics, or cram classes is small compared with working in a clinic as one of the unit.

I joined a professorial unit in a large provincial city, where the team spirit was firmly built on mutual trust and respect. The professor was a first-class teacher, an able organiser, a lucid and original thinker, and a man with a magnetic personality. One would have needed to be very insensitive not to absorb some of his enthusiasm, ideas, and ideals. He lived opposite a park through which I passed on my way to and from the hospital and at times I stopped to watch the local bowlers on the bowling-green. One day I fell into conversation with one of them. "Great game this, sir," he said, "do you play?" I confessed that I did not as I was still in the thirties. "Can't start too young, sir," he replied. "Look at me. I started at fourteen and have been playing over fifty years." He was a shrewd observant little man and in a very short time had found out where I came from and that I was working with Professor X. At the mention of this name his face lit up. "A great family man, sir, and a great doctor," he exclaimed. "He cured my little boy when he was given up for dead." A pained look came over his face, and for a moment I thought the boy must have died later, or at least been sent to Borstal. His voice became hushed and sorrowful. "You know, sir," he said "his only fault is that he don't bowl."

* * *

I was a little startled on being asked by a village priest in the south of Hungary a few months ago whether it was true that the Anglican Church objected to anæsthesia in childbirth. On being assured that opposition from that quarter had ceased a great many years ago, he said he had thought it must be only a rumour, as he knew that the Anglicans were more liberal in such matters than his own church; and yet he had always taught "his school-children" that children are such a source of pain and sorrow to their parents all their lives that no-one could object to their mothers being relieved of a little pain during their production. I am still wondering whether the interpreter really got his argument right.

* * *

I understand that the first act of the Minister of Health, when inaugurating the new National Health Service, will be to send a drove of doctors round the countryside dressed in different hues, so that the public can choose their regional colours. In these colours the new doctors will blossom forth, with car, bandages, medicine-bottle labels, and, where possible, medicines, to match.

* * *

I wish I could get tits to open our milk bottles. In my experience the "lift to open" tongue of the cardboard cap inevitably pulls off, and when I try and push my finger into the hole in the cap I get a spurt of milk in the face. Do tits have the same trouble? By now Messrs. Fisher and Hinde will know, and I hope THE LANCET will publish their findings.

* * *

From my window I can see the mainland across the water. It starts as a hundred islands, close inshore, and then climbs clear of the sea and rolls away in folds of adolescent hills, off to the back of time. In certain lights it is Scotland, and so it was tonight. The sky and the hills were every shade of purple-grey, and the sea was silver. A river boat making filthy smoke lay

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in the mouth of a firth. The smoke looked thoroughly British.

There is loveliness in many lands, but the best is that which smiles an almost English smile. Why do we ever leave?

* * * *

Since Registration, WILLIAM HAY
Thought nothing of the B.M.A.
It sent him Chits, "Beware, my friend!
BEVAN will get you in the End."
On Thursday Rounds the *Great White Chief*
Opined that it was past Belief
That one Brought Up within the Fold
Should be so Prematurely Bold.
For all the Learning he Imbibed
He still improperly described
The Democratic Show of Hands
By reference to Certain Glands,
Remarking "Drains to Doctor HILL,
It is my Duty, and I will.
I do not give a Farthing Kite
For any Sanguine Plebiscite."
He would not heed, he took the Bait,
Became a Servant of the State,
And worthy Colleagues cried "Too Late"
And chalked Rude Words upon his Gate.

Now turn the Page, see Doctor HAY
Awaiting the Appointed Day.
He bought a Bulldog, put to Flight
Physicians who approached at Night
To bomb his House, abduct his Wife,
Or Curarise his Table Knife.
The Day came round. The Plan came in.

Now Doctor HAY was somewhat thin,
(Not that he ailed—his Father had
Been known as Skidge in Hyderabad)
But after the Appointed Day
He fattened in a startling Way:
His patients who survived the Shock
Addressed him as the Radio Doc—
Inflated till he could not see
The Bursa on his own Left Knee.
His Colleagues, starving in their Garrets,
Repeated like Infected Parrots
That Socialism, one fine Day,
Would be the Death of Doctor HAY.
The Truth was simpler than they knew.
When Doctor HAY received his screw
Eight Million Pounds, Nineteen and Seven
Pence Only, Signed, ANEURIN BEVAN,
He sent it back in Righteous Terror,
Inscribed "An Arithmetic Error?"
But no. For back it came. It seemed
The figure that he thought he'd dreamed
Was accurately estimated
Consisting of the Items Stated . . . :
At last it dawned on Doctor HAY
That ever since the Appointed Day
He *was* the Service—on his own!
The fee was his and his alone:
Since no-one else was Taking Any
He got the Rhino, every Penny!

And still he grew, until at last
His bloated Corporation passed
The limit of his Surface Tension—
Such Pathological Distension
As WILLIAM's waistcoat hardly hid
Could only end as end it did.
One day in August, bending down
To tie his shoe in Kentish Town,
He strained toward his Hidden Feet
And burst, demolishing the Street.

Moral

Learn from the Fate of Doctor HAY
The Omniscience of the B.M.A.
And do not, in your Youthful Zest,
Forget that Doctor HILL knows best—
A Blackleg ever lacks a Friend
And finds it Most Unsafe to Bend.

Letters to the Editor

SELECTION OF MEDICAL STUDENTS

SIR,—Up to 1940, in most schools candidates of approved educational standard were free to enter without further selection. The privileged position of the student in war-time and the increased use of the educational ladder have, however, brought so many to our doors that schools are faced with the difficult problem of selection. On the success with which this is carried out the constitution of the future profession depends.

At the present time many examiners are disturbed by the poor general educational standard of many students at the final examination. To some extent disturbance of training due to the war may be responsible; but the trouble would appear to go deeper than this, and school training and artificial selection are two factors which may account for some of our present weaknesses. Much might be said in criticism of the hazards which the able student has to overcome on the road from a primary school to medical graduation. At a recent conference on university education the Master of Balliol observed that "those that climbed this ladder came up to the university completely worn out. In comparison a boy who had not had to struggle tended to be far better educated." Other speakers at the conference were equally concerned by the dire effects of the scholarship system and by the impairment of general education through the specialisation which accompanies it.

Added to all this, the student now has to face the hazards of the selection board. Individual medical schools have sought their own solutions, and no common policy has been evolved. Selection, the methods of which are still experimental, is made partly on the candidate's educational background and school reports, and partly through an interview by either one person or a small committee. For each school the responsibility is heavy. Often three or four candidates have to be rejected for each one accepted; the work is time-consuming and calls for wide experience, aptitude, and judgment. If human error and bias are to be eliminated it would appear desirable that the result of the interview should never depend on one person alone but should rest on the findings of a committee of at least three.

In spite of all safeguards mistakes will sometimes be made. This is particularly so in the selection of medical students, for as Prof. C. F. W. Smout points out in a recent report on selection at Birmingham University: "In every other Faculty in the University a student develops subjects he has commenced at school, but in medicine the student is constantly exploring new fields and no one can forecast what the issue will be."

If selection is to become a permanent practice, the present somewhat disconnected attempts to establish a satisfactory technique should be coördinated in the light of experience; and further consideration should be given to selection by vocational and psychological tests.

Birmingham. SEYMOUR BARLING.

MISTAKES WITH INJECTION SOLUTIONS

SIR,—Mr. Harold Dodd's letter of Feb. 7 raises some interesting points. Undoubtedly much can be done to avoid errors by a rational and unambiguous system of labelling; and a committee set up by the Ministry of Health has recently published recommendations for the labelling of ampoules of anæsthetic drugs.[1]

The desirability of avoiding gummed labels on ampoules is generally acknowledged; and machines which will print directly on glass can now be had at reasonable cost. Use of this method would eliminate danger through labels becoming detached. A further safeguard would be for commercial firms to use pharmacopœial names in their labelling instead of coining new names for established preparations.

The suggestion of tinting injection preparations with different colours does not seem very practicable, since surgeons would have to learn the colour of each preparation and the method could not be applied to substances which have to be protected from the light by amber

1. *Pharm. J.* Jan. 24, p. 54.

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bottles. Moreover, the range of colour in suitable dyes is limited, and the use of minor shade differences might lead to confusion in those whose colour perception is not acute.

With regard to the labelling of rubber-capped multiple-dose containers, I suggest that the label should be headed "Injection Solution" or "Intravenous Solution" as the case may be, followed by the *B.P.* name in large letters. Solutions not intended for injection should never be placed in bottles similar to those for injection solutions, and local anæsthetics intended for topical use should be clearly marked "Topical Solution—Not for Injection." In both the above cases the use of different-coloured labels might be an additional safeguard.

The final essential in the avoidance of errors is to check the label of any drug used, and to discard any preparation when there is the slightest doubt about its identity.

T. D. WHITTET
University College Hospital, London. Chief Pharmacist.

SUFFOCATION BY MILK FEEDS

SIR,—In connexion with your annotation on Feb. 14, you may care to publish the following observations.

The records of the Leeds coroner's court show that in the years 1945–47 21 infants, aged nine months or less, died of inhalation of vomit; the annual incidence was 6%, 9%, and 15% respectively, of all deaths of infants, excluding stillbirths, examined at the city mortuary during these three years. The depositions suggest that the same cause was responsible for the deaths of at least another 10 infants, where the cause of asphyxia was either not ascertained, or was reported to be some other factor such as convulsions.

When our attention was first drawn to this increase, in January, 1948, it was thought to be explained by the transfer of the autopsy practice to trained pathologists. It now appears, according to a statement of a Ministry of Health official reported in the *Yorkshire Evening Post* of Jan. 31, that the increase may be part of a general increase in these deaths. According to that statement:

> "In 1935 230 infants under 12 months died from accidental causes, and 59 of these were from suffocations due to application of food by bottle. In 1945 there were 407 deaths, 183 of which were attributable to food regurgitation and suffocation."

The Leeds series is small, and time has not permitted detailed inquiries; but from the available evidence certain factors appear to be relevant.

1. The majority of the infants came from homes of parents in the low income groups.

2. The age of eleven of the mothers ranged from 22 to 35 years; and the average was 26.

3. It is probable that most were first-born infants, or were born within a year of an elder child. On the other hand, 1 was the ninth in the family.

4. In a second group, soft feather pillows were responsible in 2, and probably responsible in another 4, deaths. Head shawls (1 case) can also prevent the free escape of vomit and predispose to its inhalation.

5. On 7 occasions, the records state, the infants had been crying during the hours preceding their deaths. This may have been due to illness or—more probably—to discomfort, especially from "wind." Disease (enteritis) was present in only 1 of 21 cases.

6. Some of the infants were described as "windy," or prone to retch or vomit after feeds, or they were "greedy feeders."

7. In 1 case it was admitted that the infant had been fed whilst lying down; and it appears a common practice to allow infants to suckle at the bottle when laid in their prams or cots.

8. Deaths of infants from inhalation of vomit have occurred, in our experience, in institutions, and we are credibly informed that the shortage of trained staff gives rise to anxiety on this account.

9. The stomach contents, several hours after the last feed, were distinctly in excess of what was ordinarily to be expected. There was no anatomical evidence of gastric disease.

10. The kind of food was recorded in 16 cases; and of these, 9 had had national dried milk, 4 had had 'Ostermilk,' while 3 (of which 1 had supplementary feeds of cow's milk and water) were breast-fed. The predominance of one kind of dried milk is ascribable, in all probability, to its low cost and not to any inherent property of the substance. Gardner [1] found a predominance of artificially fed infants amongst his cases.

11. The preparation of artificial milk foods must be carefully performed if lumps are to be avoided. When present in the feed, they may quite possibly be ingested by the infant if the teat is worn or its opening is deliberately enlarged; in this event, the teat may have a slit about 0·5 cm. in length, through which lumps could be sucked. We have no information to show whether the ingestion of lumps is in any way injurious and provocative of vomiting.

Although, as you rightly say, Sir, this is no new disaster, it continues to recur, and apparently with increasing frequency. In our opinion, many of these deaths appear preventable, and therefore an inquiry seems worth while. Satisfactory conclusions, however, can only be drawn from the pooled experience of several centres, and from a coördinated investigation, in which pædiatricians and those responsible for infant welfare can achieve more than pathologists, who can only prove the cause of these deaths and draw attention to the frequency of their occurrence.

We thank Dr. A. J. Swanton, the City of Leeds coroner, for permission to examine and quote his records.

Department of Forensic Medicine, University of Leeds, C. J. POLSON D. E. PRICE.

NOMENCLATURE OF RH FACTORS

SIR,—As far as I can determine from the medical literature, the consensus is that the original designations of the Rh types as rh, rh′, rh″, rh′rh″, Rh_0, Rh_1 (or Rh_0'), Rh_2 (or Rh_0''), and Rh_1Rh_2, based on the designation of the three common Rh antisera as anti-Rh_0, anti-rh′, and anti-rh″, should be the standard nomenclature. Some workers use in addition certain alternative designations, involving the letters, C, D, and E. I maintain that such a duplicate method of designation is entirely unnecessary and will only cause confusion. Experience with the four Landsteiner blood-groups has already proved that confusion is avoided only by the use of a single rational and descriptive nomenclature.

The attraction of notations using symbols like XYZxyz or Rh_{123456}, instead of the rational symbols Rh_0, rh′, rh″, hr′, and hr″ (evidence for Hr_0 has still not been published), can be explained as follows. Obviously, to people who do not know the blood-groups and are not required to understand them, notations like I, II, III, and IV are much easier to remember than O, A, B, and AB. In the former case one has but to learn that there are four blood-groups, because one presumably is familiar with the Roman numerals I to IV. To remember O, A, B, and AB, on the other hand, one is compelled to learn that there are two substances, A and B, in the blood which form four combinations. This additional effort is quickly repaid, however, in the case of laboratory workers who must be familiar with Landsteiner's rule concerning the reciprocal relationship of agglutinogens and agglutinins, and also for medicolegal experts, to whom, for example, the statement that parents of groups O and AB can only have children of groups A and B is more intelligible than the announcement that I × IV can yield only II and III. Similarly, it seems easier to "learn" that there are three factors, $Rh_1Rh_2Rh_3$ or XYZ, than that there are three factors, Rh_0, rh′, and rh″. Actually, by taking a little extra trouble to understand the original and only rational nomenclature one learns at the same time of the special serological, genetic, and clinical position of factor Rh_0, and that rh′ and rh″ are related very much as A and B are to each other. Thus, by applying what one already knows of the four blood-groups, one *immediately* knows the eight Rh types, while those using designations like XYZ must start from the beginning and never really grasp the subject. It is easy to see, for example, why the mating rh × Rh_1Rh_2 yields almost 50% type Rh_1 and 50% Rh_2 children with only rare children of types rh′ and rh″; but this is completely unintelligible when written as Neg. × Rh_{123} or xyz × XYZ.

In addition, the symbol "Rh" has an important descriptive significance, indicating the origin of our knowledge of this antigen through the study by Landsteiner and Wiener of immune sera prepared by immunising experimental animals with blood of rhesus

1. Gardner, E. *Med.-leg. Rev.* 1942, **10**, 120.

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monkeys; which antisera, these workers found, also agglutinate the bloods of about 85% of Caucasian individuals. It was because the antisera were first prepared with the blood of rhesus monkeys that the symbol Rh (the first two letters of the name Rhesus) was chosen to designate the antigen, while anti-Rh was the natural name for the corresponding antiserum. When, with the aid of antisera of human origin, it was later discovered that there are other related antigens in human blood, it was only natural that names be selected for these antigens which showed their relationship to the Rh_0 antigen originally discovered by Landsteiner and Wiener, but at the same time indicated their characteristic differences.

One final point which everyone seems to have overlooked is that as early as 1942, when only Rh_0 and rh′ had been found by me, I considered the possibility that these factors might be transmitted by genes that were linked, independent, or allelic.[1] When statistical analysis of the available data proved that the hypotheses of linked and independent genes were incorrect, we explained the hereditary transmission of the four Rh types known at that time by postulating the existence of four allelic genes. When later rh″ was found, it hardly seemed necessary to repeat the evidence against linkage and independent assortment, and so the theory was merely extended to include six standard allelic genes, to which British workers added the seventh and rarest gene R^z. Thus, Fisher's theory, besides being wrong, is not original since it had been considered and discarded by me more than two years before he proposed it. Incidentally, based on the theory of multiple allelic genes, the existence of type rh′rh″ and its frequency of only about 1 in 10,000 was predicted by me and later confirmed. Also the existence of factor rh‴ was predicted by me, only to be confirmed by Callender and Race in England, who named it c^w.

In conclusion, it should be apparent from the foregoing that the assertion made by some workers that the adoption of Fisher's notations will "clarify" the nomenclature "problem" is based on incorrect and incomplete information. Actually there is no nomenclature "problem" except the one that would be created by the unnecessary introduction of duplicate or triplicate systems of notations.

ALEXANDER S. WIENER.

Office of the Chief Medical Examiner,
New York, N.Y.

BRONCHIAL CARCINOMA PRESENTING AS POLYNEURITIS

SIR,—The contribution by Dr. Wyburn-Mason (Feb. 7) makes very interesting reading.

No-one can quarrel with his grouping of the possible causes of the polyneuritis under four main headings: (1) involvement of endoneural and perineural lymphatics of peripheral nerves by extension of the growth; (2) implantation of tumour cells in the intrathecal portion of the spine (via metastases in the brain, &c.); (3) "toxic" or "metabolic" disturbance similar to polyneuritis from other causes; and (4) reflexly from the lungs. The last-named mechanism is that favoured by Wyburn-Mason. The first two possibilities are discussed at some length and dismissed, quite rightly, because they have been ruled out by careful histological examination. The third possibility is discounted because "in the early stages of the cases described there was no suggestion of any toxic or metabolic disturbance which might cause the symptoms"—a statement which has to be reconciled with the observation that "he lost 2–3 stone in the last four months before admission."

We know that in trigeminal neuralgia violent impulses sufficient to cause trophic changes leave the nerve singularly unaffected; and one tends, therefore, to question a reflex which results in inflammation and degeneration of peripheral nerves (literally from head to toe) and leaves the cord untouched. The analogy that hypertrophic pulmonary osteo-arthropathy is also a reflex phenomenon opens up a debatable subject. "In two cases known to me," the author says, "mere ligature of the pulmonary artery without removal of the lung had the same immediate effect"—i.e., dramatic relief—and "this shows that the changes in the tissues are not due to 'toxic' absorption or anoxia, which would be increased by this procedure." Now anoxia, par excellence, is seen in congenital heart disease with cyanosis and so is "clubbing"; yet, although "clubbing" is generally accepted as the first stage of hypertrophic pulmonary osteo-arthropathy, the latter is but rarely seen in this form of heart disease. It often develops, however, in certain lung conditions, particularly when associated with sepsis. The argument that tying the pulmonary artery (thereby "cutting off" the affected lung) would result in increased "toxic" absorption is difficult to follow. Pierre Marie's original hypothesis of a liberated "toxin" may not meet all criticisms but cannot be so easily dismissed. All we are entitled to say is that the conditions are somewhat analogous to those in "crush syndrome" and essential hypertension. However, we do know that peripheral neuritis in bronchial carcinoma does not differ essentially from that due to toxic or metabolic causes; if not, why bring in a reflex theory?

What is more worrying to the clinician than the question of ætiology is the apparent difficulty of early diagnosis with no chest symptoms and possibly with a negative "straight" X ray. Does it mean, then, that every middle-aged man with polyneuritis should be bronchographed, if not bronchoscoped? It will be noted that all cases were lumbar-punctured—which was desirable because of the presenting symptoms and inevitable in the precincts of the National Hospital. (We need not pay too much attention to the canard that the lady almoner takes the cerebrospinal fluid as a routine with other particulars.)

Without any desire to be critical, may I enter a plea for the simple, non-specific, test known as the erythrocyte-sedimentation rate? Surely, in these cases, it would yield more valuable information than even lumbar puncture and might enable the process of detailed chest investigation to be started long before the appearance of terminal signs and symptoms.

London, W.1. DAVID PREISKEL.

CAROTID LIGATION

SIR,—Your leading article on Nov. 22, although giving an otherwise excellent survey of the recent literature on carotid ligation, failed to mention several valuable contributions in this field by Professor Krayenbühl,[1] who has reviewed the results of carotid ligation in 35 cases of intracranial aneurysm.[2] His series of cases, in addition to being one of the most extensive yet reported from any clinic, is further notable because neuropsychiatric studies, as well as the usual detailed neurological examinations, were made on 14 of the patients in an effort to assess the effects of carotid occlusion, particularly on the mental status of the patient. This represents an attempt to apply a test of somewhat finer grain to estimate the postoperative cerebral changes than appears to have been generally adopted in any comparable series of patients. It is perhaps of some interest that, in Professor Krayenbühl's experience, carotid ligation for supraclinoid aneurysm seems far less dangerous than is suggested by the results either of Olivecrona or of Schorstein.

It may also be worth while to point out that the potentialities of electroencephalography (E.E.G.) as a means of gauging the patient's tolerance to carotid ligation cannot be said to have been as yet adequately exploited. Although Lambert Rogers and several other authors have now reported instances in which E.E.G. investigation was done on patients in whom carotid ligation was performed, according to the recent review of Chusid and de Gutierrez-Mahoney[3] no case with serious complications following carotid ligation appears to have yet been available for E.E.G. study. The value of E.E.G., however, as a reliable and sensitive indicator of changes in cerebral function as induced, for example, by anoxia and ischæmia is now well founded on both experimental and clinical grounds. It would be surprising, therefore, if this procedure did not prove a useful adjunct in the

1. Wiener, A. S. Blood Groups and Transfusion. 3rd ed., Springfield, Illinois, 1943; p. 254.

1. Krayenbühl, H. *Schweiz. Arch. Neurol. Psychiat.* 1941, **47**, 155; Krayenbühl, H., Stolba, R. *Confinia neurol.* 1945, **6**, 6.
2. Krayenbühl, H. *Schweiz. med. Wschr.* 1946, **76**, 908.
3. Chusid, J. G., de Gutierrez-Mahoney, C. G. *J. Neurosurg.* 1947 **4**, 86.

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preoperative investigation of the patient about to be submitted to carotid ligation. Moreover, that the usefulness of E.E.G. in this rôle should be more definitely determined is of considerable importance for several reasons. Among these is the fact that the carotid compression test, as your article mentions, is often unreliable, and there is so far no well-proven alternative method to take its place. Furthermore, certain types of intracranial vascular lesions which are perhaps best treated by carotid ligation are becoming more commonly disclosed through the increasing use of cerebral angiography. For example, some 150 cases have been reported in the literature in which carotid ligation was applied as a method of treating intracranial aneurysms and arteriovenous fistulæ. Some of the most striking successes have indeed often been obtained in patients with an intracranial arterial aneurysm, which even so courageous a surgeon as Harvey Cushing [4] once described as "a lesion having such remote surgical bearings."

Cumnor, near Oxford. WILLIAM H. FEINDEL.

HOW SULPHONAMIDES ACT

SIR,—In supplement to the article by Professor O'Meara, Dr. McNally, and Dr. Nelson in your issue of Nov. 22, may I suggest yet another way in which utilisation of reductone and its combination with *p*-aminobenzoic acid to form reductone-*p*-aminobenzoic acid (R-P.A.B.) may be interfered with?

Professor O'Meara and his colleagues observed that ascorbic acid forms condensation products with *p*-aminobenzoic acid and with the sulphonamides in vitro. May it not be that ascorbic acid (A.A.) when available in *sufficient* quantities in vivo would compete for the *p*-aminobenzoic acid (P.A.B.) present in the body to form the condensation compound A.A.-P.A.B. in place of R-P.A.B.? Furthermore, the presence of excessive amounts of a dienol compound so reactive as ascorbic acid may have a toxic effect on the bacterial cell similar to that of free glucoreductone and of other reactive bacterial metabolites.

Clinically I have observed the remarkable effect in halting an acute infection of saturating the patient with ascorbic acid at the earliest possible stage. Two ways of practical application suggest themselves:

1. If a case comes under treatment sufficiently early—i.e., before a general spread of the infection has set in—large doses of ascorbic acid are given, such as an initial dose of 500 mg. within the first few hours of treatment and followed by saturating doses. The A.A. would compete with reductone for the P.A.B. present, and would thus interfere with the multiplication of bacteria during the logarithmic phase. The giving of sulphonamides as a routine could, therefore, be avoided in such early cases.

2. If infection has already become generalised sulphamerazine and 'Sulphamezathine' (there appears to be no justification for the clinical use of older sulphonamides since these safer drugs are available) are used either singly or in combination as a mixture.[5] Ascorbic acid is given simultaneously, either by mouth or parenterally, in doses sufficient to saturate the patient at the earliest possible moment. Considering the relative speeds with which condensation compounds are formed, a double effect would be achieved: the sulphonamides administered would be used up in the formation of the reductone-sulphonamide compound, and P.A.B. present would subsequently be tied up as A.A.-P.A.B.

For the last three years I have given sulphamezathine (I.C.I.) and large doses of ascorbic acid, combined with vitamin A and other measures, in cases of acute infection with sulphonamide-sensitive organisms. There has been a complete absence of the usual complications of acute infections in every case. This remarkable experience appears to have a possible explanation in the above suggestions.

The rationale for the simultaneous exhibition of large doses of vitamin A (in the region of 100,000 units per day), incidentally, has been to saturate with this vitamin that bastion of the body's defence mechanisms, the reticulo-endothelial system, and to ameliorate the condition of the epithelial surfaces of the body.

Bracknell, Berks. B. L. FRANK.

4. Cushing, H. *Guy's Hosp. Rep.* 1923, 73, 159.
5. Lehr, D. *Brit. med. J.* 1947, ii, 943.

WHAT IS NURSING?

SIR,—Many of the suggestions in your leader of Jan. 10 are futile. If they were discussed, as I have already discussed them, with a successful working matron, she would readily point out their fallacies and impossibilities.

There is only one fundamental reason for the lack of enough nurses, and that is *marriage*. In the figures you quote 30% left on getting married, and I can assure you that of the 42% who became pupil midwives probably an equal or higher proportion married at the end of their training period. Our own investigations here, usually carried out yearly or in alternate years, show that 50–75% of nurses marry and leave nursing between the time they take it up and one year after qualifying. Of those still in, most get married within a few years. The wastage during the first few months is an index of the efficiency or otherwise of the specific training school to appeal to the nurse—a high wastage reflects directly upon the administration.

You say that the King's Fund has been able to add an important new study; this is not new to those of us who are engrossed in the question of nursing and have the coöperation of intelligent and up-to-date nursing matrons.

You do not mention male nurses. All training schools, including children's hospitals and hospitals for infectious diseases, should take them. Each man trained equals at least 6 female probationers because he will remain in nursing all his life. Male nurses should be used for district work and in every branch of nursing. In this hospital they do children's nursing, and I have been agitating for them to be given midwifery training. In the *Sunday Express* (Jan. 11) a note appeared to the effect that in Manchester male nurses employed on district work who had been given emergency midwifery training had proved so successful that their numbers were to be augmented.

You say "the idea of employing qualified married nurses on a part-time rota in training schools has never been considered." We have employed them here for many years, and my matron, who has been here for 6 years, tells me that she was employing them in London 9 years ago.

We here allow any of our nurses, student or qualified, senior or junior, to live out of hospital, either at home or in billets provided by the hospital, for which we pay; the nurse receives the resident allowances. It does not make a great deal of difference in recruitment: a few are kept in nursing and are attracted to nursing by these manœuvres, but the fundamental reason for girls giving up nursing is that they get married and when they have a family they no longer desire to work. Until a family appears they are quite willing to carry on, on a part-time or full-time basis. All these factors have been known here for many years and we have put them into practice. You may think it is because of this that our numbers have gone up from 85 ten years ago to 240 now, with the same number of beds but with a greatly increased turnover to deal with: I agree with you. I think it is because so many hospitals and their organisations are so rigid and out of date that difficulties still persist.

This nursing problem appears to be a complex one but is in fact not so difficult on analysis. The need is for more male nurses; less insistence on the educational standard of nurses on admission, so long as they have it in them to be good practical nurses; and the avoidance of administrative and disciplinary measures which have been traditional and which had not yet been given up in certain hospitals. I recently visited one large training school where I was assured the matron refused to tolerate a married student, and any student who got married was immediately dismissed even if she was willing to continue her training. Again, some hospitals refuse to recruit nurses from their own locality. The problem I think will solve itself when the school leaving-age is raised to 16, and "the gap" is practically eliminated.

My last point is working time: 40 hours weekly, including study time, is surely quite enough for young girls.

H. I. DEITCH
General Hospital, Halifax. Medical Superintendent.

*** We have often advocated the wider employment of male nurses.—ED. L.

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CANINE HYSTERIA AND AGENISED FLOUR

SIR,—We have recently had the opportunity for the first time of being present when Sir Edward Mellanby exhibited his film *Canine Hysteria*. In view of the prominence which has been given in the medical press [1] to Sir Edward's reports on the rôle of agenised flour and wheat products in the causation of canine hysteria [2] and the widespread deductions, based on these reports, concerning the importance of agenised flours in the ætiology of canine hysteria, we feel that, as clinicians closely concerned with canine disorders in our professional duties, we should draw attention to certain matters relating to the diagnosis.

1. In several cases shown in the film the clinical signs were not typical of the condition which for many years we have recognised clinically as canine hysteria.

2. The disorder was not similar to the form of canine hysteria that we have observed in the London area and the provinces since the war years, when it has been much less common than formerly.

3. In particular, certain animals appeared to exhibit neurological signs, such as severe clonic choreic movements of the jaws and head, complete loss of vision, incoördination of gait, and hyperflexion of the hind limbs; these are strongly suggestive of localised nervous defects, which are more usually associated with an infective encephalomyelitis, and are certainly not seen in natural cases of uncomplicated canine hysteria. Furthermore, in the naturally occurring disease the severe epileptiform convulsion is not a common feature.

If the film is truly representative of the syndrome that Sir Edward observed—and we can only suppose that it is so—then there would appear to be grave doubts as to the precise nature of the disorder, and indeed whether it was in fact a single ætiological entity.

While this possibility does not detract from the interest in the action of the agene process on wheat proteins, we would suggest that the term "canine hysteria" should not be applied to this condition until the disorder has been investigated more fully. For the present, therefore, perhaps the term "agene intoxication" might be a more suitable diagnosis for the disorder produced by feeding agenised proteins to dogs.

M. HARVEY CLARK
S. F. J. HODGMAN
JOAN O. JOSHUA
HERBERT PARRY
OLGA UVAROV.

PLANTAR WARTS

SIR,—In his article of Jan. 31 Mr. McLaughlin calls for "rational" treatment of plantar warts. Whilst deploring, as must all, the bad results of ill-judged radiotherapy, I should like to make these comments:

1. Dosages of X rays in two units are quoted without any reference to the quality of the radiation. This is, to say the least, misleading.

2. Any radiotherapist of experience will know that doses of 800r, 900r, or 1200r given under the usual conditions, even if repeated, will not cure a plantar wart. It is this very technique of repeating doses of this order which produces the burns complained of.

3. Those who have studied and who know the biological effects of X rays and gamma rays on both normal and diseased tissue know full well that the destruction of hypertrophied normal tissues requires very large doses of irradiation. This, however, is not the aim in the treatment of plantar warts. If doses of this order are given to healthy skin a burn will certainly occur. This is particularly true of the sole of the foot, which with the palm of the hand is notoriously sensitive to radiation from such sources—a fact well known to radiotherapists.

4. The writer refers to "a general reluctance to face the stubborn fact that many plantar warts are insensitive to safe doses of X rays." We might ask, on whose part does this reluctance exist? All radiotherapists, and even dermatologists, should know that "all" plantar warts are insensitive to "any" doses of X rays.

5. The use of the word "irrational" as applied to radiotherapy is most strenuously refuted. Any method of treatment, unless carried out with due regard to basic underlying principles, is liable to failure. For this reason radiotherapeutic measures, unless employed with a full knowledge of the action of the radiation, are also likely to be without success. This, however, does not in the least imply that radiotherapy is an "irrational" procedure.

It may be of interest to know that very many cases referred for irradiation have already been previously subjected, without success, to diathermy coagulation, fulguration, carbon-dioxide snow, cauterisation, or scraping and excision.

London, W.1. F. M. ALLCHIN.

SIR,—I have been interested in the correspondence on this subject.

No-one has so far mentioned the very simple method of treatment of applying elastic adhesive bandage directly to the wart. The bandage should remain in place for a week or two at a time and be renewed as it loosens. The wart will be found to peel out with the bandage. No method could be more simple, cheap, or effective. Only in the presence of severe pain does surgery seem to be needed.

Cirencester. R. E. HOPE SIMPSON.

HEALTH CENTRES

SIR,—It is regrettable that it has become impossible to build immediately health centres, which would provide the general practitioner with (1) the means of having laboratory and other investigations carried out on the spot, (2) the advantage of sharing secretarial and nursing staff, and (3) closer and more friendly coöperation with his colleagues. Experimental centres, however, can be started where suitable premises are available for conversion and would provide a means of discovering the sort of permanent establishment best suited to the peculiar needs of each district. A preliminary approach would be to get together in a committee general practitioners, specialists, representatives from the local health authority and social services, and others whose work is concerned directly with the maintenance of physical and mental health. Such an attitude of coöperation would, to my mind, be much more in keeping with the dignity of the profession than the present rather hysterical defence of an obsolete system of medical service.

London, N.W.3. N. CHISHOLM.

CALF PLASMA FOR TRANSFUSION

SIR,—I read with much interest the article by Dr. Massons, of Barcelona, in THE LANCET of Sept. 7, 1946. I was asked by Prof. Ali Bey Hassan, dean of the faculty of medicine, to prepare calf plasma and test it on animals and patients.

I used practically the same technique as Dr. Massons. To the citrated bovine plasma, formol and, a few minutes later, ammonia are added. The plasma is then diluted with doubly distilled water so that the concentration of proteins becomes round about 4%. The plasma is heated to 100°C, cooled and filtered, put in glass ampoules, and tyndallised. Plasma treated in this way undergoes slight discoloration and becomes opalescent. The pH of different samples is between 7·2 and 7·5. The viscosity is increased by such treatment from about 1·4 to about 1·8. This treated plasma keeps well at ordinary temperatures, and it does not agglutinate or hæmolyse human red blood corpuscles. By this method the anaphylactogenic properties of calf plasma are destroyed.

Rabbits were injected subcutaneously with 1 ml. of untreated plasma on three consecutive days. After three weeks they were injected with 5 ml. intravenously. In a short time the animals died of severe dyspnœa; this is the sign of anaphylaxis in rabbits. Another batch of rabbits was injected by the same technique with treated plasma; no anaphylaxis took place and the rabbits were well and healthy 24 days after the last injection.

We used the treated calf plasma for patients in the faculty hospital with the following conditions: (1) burns; (2) shock from wounds or ileus—i.e., cases of surgical urgency; (3) hypoproteinæmia; and (4) dehydration in infants. The results were very satisfactory and encouraging, and not inferior to those obtained with human plasma. No reactions were observed beyond transient slight pain along the vein during the first part of the

1. *Brit. med. J.*, leading article, 1946, ii, 903; *Lancet*, leading article, Jan. 3, p. 27.
2. Mellanby, E. *Brit. med. J.* 1946, ii, 885; *Ibid*, 1947, ii, 288.

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transfusion. There was no suspicion of urticaria, which is the most constant sign of serum sickness.

The advantages of calf plasma as compared with human plasma are the cheapness and simplicity of its preparation. The preparation of human plasma is so tedious and the price so high that it is beyond the reach of the poor. Moreover, it has not been easy to obtain in sufficient amounts during the epidemic of cholera in Egypt. Calf plasma can be stored without deterioration and there is no need for refrigeration or any other special conditioning. Anybody who can give an intravenous injection can administer it; its action approximates closely to that of human plasma, and its effect is not merely temporary like that of saline. Furthermore, it does not carry the danger of transmitting hepatitis as does human plasma.

I wish to thank Prof. Ali Bey Hassan, under whose supervision this work was done, for his kind aid and helpful criticism.

Farouk University, Alexandria. H. BARSOUM
Assistant professor of clinical pathology.

STREPTOMYCIN NEEDS

SIR,—I read your leading article of Feb. 21 with great interest. It is important that the present position regarding the use of the drug and its potentialities should become widely known, though whether, in the present state of our knowledge of the end-results, treatment should be given to all cases is open to doubt. In any case I cannot help feeling that you underestimate the number of beds that will have to be set aside for the treatment of cases of tuberculous meningitis.

In the first place, I think your suggestion that of the 2000 cases occurring annually only half are suitable for treatment is too low an estimate. Secondly, we do not yet know the length of time a patient will have to be kept under observation until the possibility of relapse can be safely disregarded. Of 12 children with tuberculous meningitis treated for more than eight months in the Royal Hospital for Sick Children, Glasgow, 3 relapsed seven or more months after treatment had commenced. Relapse in tuberculous meningitis is a new phenomenon, for until the introduction of streptomycin all cases died in the first attack. It is widely believed that the meninges become infected from a cerebral tuberculide which ruptures or ulcerates into the meningeal spaces. While streptomycin seems to be able to arrest the meningitis, it must be remembered that there remain numerous tuberculides scattered throughout the brain which have not been sterilised, and that any one of them may reinfect the meninges. We have to rely on the natural defences of the body for the healing of these lesions; all we can do is to encourage this by placing the patient in the best environment. The length of time required for healing is unknown and probably depends on many factors, but it would be safe to say that a year would not be excessive.

You base the bed requirements on an average stay of six months and suggest that, to treat all suitable cases of tuberculous meningitis, 300 beds will be necessary. If, as I suggest, treatment should continue for a year, double that number of beds will have to be provided. Moreover, if, as I think is likely, you have underestimated the number of cases requiring treatment, the bed accommodation will have to be augmented still further.

These observations are not made with the object of discouraging the wider use of streptomycin but to call attention to the administrative problem which will arise if the cure of tuberculous meningitis requires treatment comparable in duration to that of other forms of tuberculosis.

Glasgow. GEOFFREY B. FLEMING.

THE MAJORITIES

SIR,—Your leading article of Feb. 14 says: "A big responsibility . . . rests on the B.M.A. council when it meets next week to review the result of the plebiscite. Very possibly it may, like the Minister, have the support of the large majority for which it asked—a majority in each case composed largely of people who do not fully understand the issues."

Is it true to suggest that the size of the majority of doctors voting against the Act is due to their not understanding the issues? During the last twelve months doctors have had every opportunity of studying the Act, its benefits and its shortcomings. True, it is upon the latter that the B.M.A. has mostly concentrated, but the merits of the Act have been widely canvassed in the press, in the House by the Minister himself on various occasions, and in the country by other members of the Government. When the *British Medical Journal* published the Negotiating Committee's statement, in the same issue was the Minister's reply and also a paper entitled "General comments of the Minister, addressed to the individual doctor." These documents were posted to every member of the profession.

There is no evidence that all this information has been ignored by the doctors. At the time of the second plebiscite they had far greater knowledge than when the first was taken. It is important to note the effect of this greater knowledge. Combining the consultant-specialist group with the general practitioner group—as being those upon whom the principal onus of running the new service will fall—we find that 41% of those voting in 1947 were in favour of the Act and only 10% now. In other words, the more the profession understands the issues, the less it likes them.

By mentioning the two majorities in the same sentence there is carried an implication, unintended we are sure, that this is a party matter. Maybe there are some who feel that the situation could not have been worse handled than by the present Minister. Maybe there are those who think that the Labour Party are selling the public a Civil Service type of medicine for which they had no mandate at the election. To these extents politics may enter the field, but to say the whole dispute is a political issue is just another ministerial red herring. We do not believe that the mass of doctors is any more concerned with the fate of the political parties in this matter than those parties appear to be concerned with the fate of medicine in this country. We are quite certain that whatever party had perpetrated the present Act it would not have found favour with the medical profession.

R. HALE-WHITE
Chairman, St. Marylebone Division, B.M.A.
HORDER
Chairman, Consultants and Specialists Liaison Committee.

TREATMENT OF ARTHRITIS BY INTRA-ARTICULAR INJECTION

SIR,—We should like to answer some of Dr. Nicholson's interesting criticisms (Jan. 31) of our article published on Jan. 17.

Our statement that "while under injection treatment patients have received no other form of therapy" referred of course to the fact that during treatment no form of physiotherapy was used other than active exercises, which we regard as an integral part of the treatment.

Dr. Nicholson wished to know the comparative results of treatment on hips and knees. These are as follows:

	No. of cases	
	Knees	*Hips*
(1) No improvement	8	9
(2) Slight improvement (continuing injections) ..	4	4
(3) Slight improvement (ceased injections) ..	3	1
(4) Moderate improvement (continuing injections)	6	2
(5) Moderate improvement (ceased injections) ..	5	3
(6) Great improvement (continuing injections) ..	1	3
(7) Great improvement (ceased injections)	7	7
Totals ..	34	29

It will be seen that in this little series the results of injection treatment were in fact comparable for the two types of joint.

We agree that the criteria offered as proof of hip-joint puncture are not absolute. We too have acquired a proper humility as a result of practice, not with the injection of an opaque dye but with injection of Bonney blue in the cadaver. We realise that the hip-joint is often extremely difficult to puncture. Where, however, we have considered it likely that the injected fluid has not entered the joint space, we have always made a note to that effect. Again and again after such an unsatisfactory injection the patient has complained, on his next attendance, that "things have not gone so well" or that pain and dysfunction have actually increased. Moreover, if the fluid fails to enter the joint cavity anæsthesia is not complete and this alone is a sign of failure.

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Commonly entry into the hip-joint can be confirmed by withdrawal from it of some of the injected fluid; a mere 10 ml. disseminated through the periarticular tissues would surely not be recoverable. It is agreed that crepitus could possibly be caused by periarticular friction, but it is difficult to see the virtue in this hypothesis. Only in the grossest arthritis is knee crepitus not relieved by the injection of fluid into the joint, and in these cases presumably the grating surfaces are too rough for the sound to be silenced by the fluid. In this joint successful puncture is seldom in doubt. In the osteo-arthritic hip (where the X-ray film usually shows obvious roughening of the joint), Dr. Nicholson asks us to believe that the crepitus is due to an extraneous cause for which we have no radiological, clinical, or pathological evidence.

Since submitting our article, one of us (M. S. C.) has shown that during early treatment there is a quite definite and constant recurrence of pain about 14 days after injection. It is difficult to see how the effect of the procaine could last so long or how fluid injected, not into the joint but, as Dr. Nicholson suggests, around it could have such prolonged virtue or show such constancy in the duration of its effectiveness. Our theory that this surprisingly constant period represents the time that a degenerated joint takes to rid itself of fluid and return to its untreated dry state seems to us much more in keeping with the observed facts.

Lastly, we agree that the question of the relationship of joint pH to the disease process is fundamental; but we feel, as a result of our preliminary work, that its importance may have been overemphasised and that this relationship may in the end be found to be nebulous and quite unimportant, at least in the treatment of the established condition. One of us (M. S. C.) is, however, planning some work on this. We feel that investigation into the effect of local vascular changes, primarily upon the synovial drainage and secretion equilibrium, and secondarily upon the loss of fluid and drying of the joint, resulting possibly in denudation and erosion of the joint cartilage, may prove a more profitable line of research.

Dr. Fox (Feb. 14) compares our results with those of other treatments. He stated that we had 14 successes and 13 failures. In fact our figures were: 13 in which the treatment was unsuccessful and 41 in which definite improvement was noted, while in 14 of these the success was outstanding.

Northwood, Mddx. DUDLEY M. BAKER.
Southend-on-Sea. MARK S. CHAYEN.

Parliament

FROM THE PRESS GALLERY

Attempted Rape Bill

IN the House of Lords on Feb. 17 the Lord CHANCELLOR moved the second reading of this Bill.[1] During the debate Lord FARINGDON admitted a lack of enthusiasm for the Bill, which seemed to him to show no appreciation of modern views of crime and punishment. This particular crime was one for which he believed punishment could not be a deterrent. It was probably true that at least 90%, and possibly all, of these cases arose really from a psychological maladjustment. He could have wished that the Bill had shown the Government's awareness of the need for special treatment of offenders of this sort. To protect society—and that presumably was the aim of all punishment—it must be recognised that a criminal of this kind required treatment if he was ever to be released into society again. Without such treatment it was no better to confine a man for seven years than for two years. Lord Faringdon added he would prefer to see an offender of this sort confined indefinitely and subjected to treatment, until competent medical authorities were prepared to take responsibility for his release; otherwise he should remain secluded from society.

Scientific Books from Abroad

In the House of Lords, on Feb. 18, Lord BALFOUR OF INCHRYE called attention to the present restrictions on the import of books which were heavily handicapping the book trade and those responsible for the supply of scientific literature. University College, London, for instance, had had great difficulty in obtaining American scientific books. At the University of Durham lecturers had to write weekly sheets for distribution to their classes because of the difficulty of getting textbooks. The Biochemical Society said that this year's edition of *The Annual Review of Biochemistry* had been held up for many months owing to Customs difficulties. The Physiological Society also complained of their troubles. One and all, these learned bodies declared that they were hampered by the import restrictions themselves and by the administration of these restrictions.

There were sometimes delays of 4 or 5 months before import licences were obtained from the Board of Trade, and as the Customs only guaranteed to hold a consignment 28 days at the dockside there was a danger that books would never be delivered to the proper recipient. He suggested that there should be a maximum time laid down in which these licence applications should be dealt with. He also proposed that the quota of 100% of the 1938–39 trade should be increased to 200% to allow for the change in the value of money. Finally, he suggested that blanket licences up to a given amount should be granted to universities, libraries, and other approved scientific bodies.

Lord CHORLEY, replying for the Government, pointed out that in 1947 an open licence for serious books had been granted. The result was a tremendous increase in the supply. By the time the dollar crisis reached us in August we were spending about £1 million a year on these books, many of which were rubbish masquerading as biographies and so forth. In our difficult economic situation, it would have been unreasonable to leave these books untouched when the imports of food supplies were being cut. It had therefore been found necessary to return to the quota system, and the quota was fixed at 100% of the pre-war amounts allocated to different firms. As a result of discussions which were taking place between the Board of Trade and representatives of learned institutions it might well be that some increase would be made in the quota, but he could not hold out any hope that there would be an increase to 200%. He would consider the suggestion of blanket licences for universities and similar institutions, but if it were found that the general quota could be increased, it would be more effective, he thought, to increase the allocations to booksellers, as the universities were not constituted to embark on the business of importing books.

QUESTION TIME

Coöperation

Mr. D. L. LIPSON asked the Minister of Health if he would now invite representatives of the British Medical Association to meet him so that a further attempt might be made to ensure that the National Health Act would have the coöperation and good will of the doctors when it began to operate on July 5.—Mr. A. BEVAN replied: I remain ready to coöperate closely with any professional spokesmen who want, with me, to make the new service a success.—Mr. LIPSON: Can the Minister go a little further and invite representatives of the doctors to meet him, because, in the interests of the health service, all the country wants is a victory for common sense?—Mr. BEVAN: We all want a victory for common sense, but I should not be entitled to go behind the back of the House and suggest that Parliament can surrender any position it has taken up.

Sir H. MORRIS-JONES: Would the Minister care to make a start towards proper negotiations again by withdrawing a statement which he made about the "raucous voiced" leaders of the British Medical Association, who have now been shown clearly as only interpreting the wishes of their constituents?—Mr. BEVAN: It remains to be seen how long they will interpret the wishes of their constituents. As the debate last week showed, every concession has been made by the Government. It is now time that concessions were made on the other side.

Lieut.-Colonel M. LIPTON: Will the Minister see that the loyal and gallant minority of doctors who are willing to coöperate with the Government is protected against any possible form of intimidation and victimisation?—MR. BEVAN: Certainly.

Mr. LIPSON: Is the Minister aware that I am not asking him to go behind the back of Parliament, but to follow up some of the concessions which were suggested, or some of

1. See *Lancet*, Feb. 7, p. 232.

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the doors he opened, in his speech in the House, to see if it is possible to resume the negotiations?—Mr. BEVAN: I am always ready to listen to any fresh representations that may be made to me. I have always been ready to meet the representatives of the medical profession, and am still ready if they have any fresh suggestions to make.

Papworth Colony

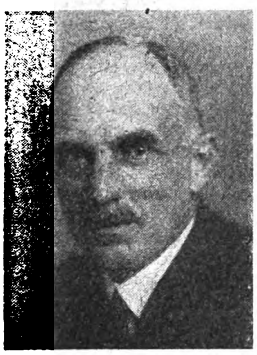
Mr. A. E. STUBBS asked the Minister what would be the position of Papworth Industries Limited after July 5.—Mr. BEVAN replied: The industries will continue under voluntary management, but the sanatorium will become part of the hospital service.—Mr. STUBBS: Is the Minister aware that the employees of Papworth Colony, most of whom are outpatients, are much alarmed at the rumour that the industries will not be taken over; and will he consult the management and the trade unions concerned before any change takes place?—Mr. BEVAN: As I have said, the Papworth Industries will not be taken over because they are not part of the health service.

Obituary

PHILIP EDWARD HOMER ADAMS

M.A., B.M. OXFD, F.R.C.S., D.O.

Mr. P. E. H. Adams, who died on Feb. 12 at the age of 68, had been connected for over fifty years with the Oxford Eye Hospital, which was founded by his uncle, Robert Doyne. The son of G. D'Arcy Adams, M.D., he was educated at Lancing College and Exeter College, Oxford. His association with ophthalmology began as an undergraduate, for his uncle encouraged him to accustom himself to the use of the ophthalmoscope at the eye hospital. He was also a keen member of the university fencing club—another of his uncle's creations.



[Elliott & Fry.

In 1901 Adams took his B.A., and three years later he qualified from the London Hospital, taking the F.R.C.S. the following year; in 1910 he took his B.M. and the D.O. In 1904 he joined the staff of the Oxford Eye Hospital as a clinical assistant, becoming assistant to the honorary staff in the following year, and he was elected surgeon in 1910. In 1913 he was appointed Margaret Ogilvie reader in the university, a position he held till 1941, and from 1912 he was also consulting ophthalmic surgeon to the Radcliffe Infirmary.

Mr. Adams held office as president of the ophthalmological section of the Royal Society of Medicine, and as vice-president of the Ophthalmological Society of the United Kingdom. A founder member of the Oxford Ophthalmological Congress, he served as master from 1926 to 1928, and as deputy master from 1929 to 1942. "After the hospital," writes O. B. P., "the congress was Adams' chief professional interest. He raised it to the status of an international meeting, while retaining its friendly, almost domestic character. Another of his interests was the diploma of ophthalmology, in which he took pride in maintaining a high standard, both in the courses of instruction and in the examinations. He himself was a fine teacher and many ophthalmic surgeons owe much to his practical common sense. In his dealings with his patients, whether in hospital or in private practice, he never spared himself, and he would not rest content until he had thoroughly thrashed out all that could be known about a case and he felt that everything possible had been done."

"Adams was a much loved figure in Oxford," adds A. C. L. H., "and he will be remembered with affection by those who consulted him both at the hospital and in his private practice. Those who worked with him were always impressed by the care with which he examined his patients and the thoughtful consideration he gave to each."

Mr. Adams broke his long association with Oxford in 1946 when he retired from practice and went to live at Theberton in Suffolk. By his first wife, Marjorie Smith, who died in 1924, he had a son and two daughters, who survive him with his second wife, Helen Weller-Poley, whom he married in 1929.

WILLIAM HENRY DICKINSON

M.R.C.S.

Dr. W. H. Dickinson, who died on Jan. 31, was the son of Edward Dickinson, F.R.C.P. After leaving Cambridge University he qualified from St. George's Hospital in 1903. Possessing private means he spent most of his life at Hoylake in Cheshire, where golf became his main occupation and interest, interspersed with winter sports in Switzerland.

When war broke out in 1914, Dickinson joined a field ambulance as a driver, but before his division embarked for France in March, 1915, he had become a medical officer to his field ambulance. For four years he served in France and took part in all the battles undertaken by his division. He never sought distinction: the satisfaction of being "one of a crowd," especially one of a staunch crowd, was all he desired. Beloved by all who came into contact with him, he never made an enemy, for his unselfishness, good nature, and cheerfulness inspired affection and disarmed bitterness. F. C.

Brigadier H. B. F. Dixon, who served with Dickinson in France, writes: "Dickinson had given up medicine for some time before the war, and he felt he was not good enough to be a medical officer, so he joined up as an ambulance driver and was quite happy in the job. It was with the greatest difficulty we persuaded him to take his place professionally in the unit, where his charm of manner and cheerfulness made up for any academic knowledge he claimed to have forgotten. He was never happier than when he was in 'the line' either in a R.A.P. or with an advanced dressing-station, where his lovable character, good humour, and common sense made things run smoothly and kept morale high. Despite his pretended ignorance of higher medicine and surgery, his patients, sick and wounded, appreciated his care and attention."

Dr. ROLF CREASY, who died on Feb. 20, founded the Medical Golfing Society towards the end of the last century and was its secretary for fifty years. On his retirement from office last year the members marked the occasion with a presentation. Dr. Creasy, who was the last surviving son of Sir Edward Creasy, historian, qualified from Guy's Hospital in 1885.

Appointments

ANDERSON, THOMAS, M.B. Glasg., D.P.H.: asst. M.O.H., Ealing.
FANNING, JAMES, M.D. Lond., D.P.H.: deputy county M.O.H., Surrey.
FRANKLIN, J. A. C., M.B. Lond., D.P.H.: deputy county M.O.H., Gloucestershire.
JOHNSON, ETHEL, M.B. Durh.: registrar, radiotherapy department, Westminster Hospital.
LLOYD, J. T. A., M.B. Manc.: asst. pathologist, Park Hospital, Davyhulme, Manchester.
PARKER, W. S., M.B. Manc., D.P.H., D.I.H.: M.O.H., Cromer, North Walsham, Sheringham, and Erpingham, and M.O., E. Norfolk Joint Isolation Hospital.
ROGERS, K. B., M.D. Lond.: clinical pathologist, Children's Hospital, Birmingham.
STIDOLPH, N. E., D.M. Oxfd, F.R.C.S.: surgical registrar, Prince of Wales's General Hospital, London.

Middlesex County Council:

BONNIN, J. G., M.B. Melb., F.R.C.S., M.R.C.O.G.: surgeon, Central Middlesex County Hospital, Park Royal.
MULLARD, K. S., M.A., M.B. Camb., F.R.C.S.E.: thoracic surgeon, Hillingdon and Harefield County Hospitals.
PERKINS, A. C. T., M.C., M.D. Lond., D.P.H.: county M.O.H.
PHILLIPS, J. B., M.D. Lond., D.P.M.: chief physician, Springfield Mental Hospital.
ROYDS, J. E., M.B. St. And., M.R.C.P.: chief assistant in medicine, Ashford County Hospital.

Colonial Service:

BARWELL, A. H., M.R.C.S.: M.O., Kenya.
BATHFIELD, C. A., M.B.E., G.M., F.R.C.S.: orthopædic surgeon, Mauritius.
DORAN, T. A., M.D. St. And.: M.O., Fiji.
FRISCHMANN, PAUL, M.D. Cagliari: M.O., Nigeria.
HINGSTON, C. W. J., M.R.C.S.: M.O., Gold Coast.
MACBEAN, DOROTHEA, B.SC., M.B. Aberd.: M.O., Gold Coast.
SHAW, G. I., M.B. Glasg., D.T.M. & H., D.P.H.; senior health officer, Hong-Kong.
SHOUCAIR, E. S., M.B. Edin.: M.O., Jamaica.
SPICER, J. R. C., M.B. Lond., D.T.M. & H.: senior M.O., Tanganyika.
VICKERS, W. J., M.R.C.S., D.P.H., D.T.M. & H.: director of medical services, Singapore.

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Notes and News

SUPPORT FOR HOSPITALS IN THE NATIONAL HEALTH SERVICE

A MEMORANDUM on personal support for hospitals in the National Health Service, issued by the British Hospitals Association, answers many questions in the minds of present hospital supporters and workers. It shows the very wide range of opportunity which will remain for helping in the work of hospitals after their ownership is transferred to the Crown, and it emphasises the need for continuance of personal interest in, and voluntary service for, the hospital patient. "There will still be need in the hospital service for local interest, local initiative and local support; and . . . those generous helpers who have in the past done so much to meet human needs, to foster interest and to stimulate progress in our hospitals will continue to find in them a field in which very valuable service can be rendered to the community."

After July 5 gifts can be made to any particular hospital and will be retained by that hospital for its own particular use. These gifts need not be earmarked for a special purpose and will in no circumstances be taken away from the hospital either for redistribution or for relieving the Treasury of meeting the full costs of the ordinary maintenance of the hospitals and their services. The memorandum gives many illustrations of the purposes for which gifts will be welcome, including medical research, amenities for the staff and patients, and supplementation of the resources of the hospitals to stimulate progress in medical treatment and in methods of hospital administration.

This useful and timely memorandum should correct many misapprehensions. Copies may be had, for 3*d.* post free, from the association at 52, Green Street, London, W.1.

REPRESENTATION OF HOSPITAL OFFICERS

THE proposal to launch a new National Federation of Hospital Officers is criticised in a letter we have received from representatives of ten trade unions and other organisations, including the National Association of Local Government Officers.

The signatories say that the majority of hospital officers are already attached to one or other of these ten bodies, "all of which in their appropriate spheres can adequately cater for their existing members in the new situation arising out of the Health Service Act, and for any staffs, and particularly those in voluntary hospitals, which have not hitherto been within the scope of collective bargaining." The move to set up a new organisation "is seriously prejudicial to the work already done, and the further effort yet to be made, in getting into running order the new bargaining machinery for the national service. Within the last month or two, the existing organisations, at the invitation of the Minister, have had a series of consultations on the new machinery to deal with pay and service conditions, and by a remarkable display of coöperation and good will have reached agreement with the Minister and among themselves on its main principles and have already in a number of cases agreed on their own representation on the staffs' side of the several functional councils of which it will be comprised. It has been reported to us that the promoters of the movement have put it out that the Minister considers that certain grades of the service should belong to a separate organisation. We have sought and received an assurance that this is not so. We have all long experience of the organisation of hospital staffs and we shall continue to consult each other with a view to effective action. We do not intend to see our existing work undone or our further work prejudiced. It is our policy to coöperate with the Minister and with each other in implementing the great legislative benefits of the Health Act to the best public advantage; and to secure all that is justly due to all officers and servants who will serve the public in this sphere."

MEDICAL CERTIFICATES FOR DIABETICS

THE Minister of Food has decided, on the advice of the Food Rationing (Special Diets) Advisory Committee of the Medical Research Council, that doctors may in future certify patients suffering from diabetes mellitus for extra allowances of food on form RG50 instead of the special form which requires a statement of the insulin dosage. A statement of insulin dosage need no longer be given; form RG50, stating that a patient is suffering from diabetes mellitus, will qualify the holder for extra allowances of meat, cheese, butter, and margarine until the end of the rationing year. These allowances can be renewed at the end of the rationing year without a further medical certificate. If the doctor wishes a diabetic patient to receive also a priority allowance of milk, he should state on the RG50 not only that the patient is suffering from diabetes mellitus but also the appropriate qualifications for milk as set out in MED.2. The milk allowance will be granted up to the end of the rationing year and will be renewed only against a further medical certificate.

ORTHOPTIC JOURNAL

THE *British Orthoptic Journal* has appeared again after an interval of three years. The new issue (no. 4) of this well-produced journal contains articles by 27 contributors. These cover a wide variety of subjects, including Service orthoptics, of which accounts are given by several of those who worked in this country and in the Middle East. Modern technique and choice of operation in squint surgery are both well described; and results of operation alone are compared with results where this has been combined with orthoptics. Among the contributors are several ophthalmic surgeons. Many interesting points in the progress made during the last five years in the training of squint patients may be gathered from these pages.

HISTORY OF PUBLIC MEDICAL SERVICES

Dr. René Sand, professor of social medicine in the University of Brussels, in his recent Chadwick lecture on How Medicine Became Social, said that in Greece the municipalities created a public medical service and the example was followed in Asia Minor and Sicily. The municipal physicians, appointed by a vote of the citizen's assembly, were well rewarded in money and honours. The city provided a large and well-lighted building with a waiting-room, consulting-room, operating-theatre, dispensary, and accommodation for outpatients as well as residence for the physician. A special tax was levied to maintain this public medical service. In course of time this movement extended throughout the Roman Empire, but as the Empire crumbled there followed a period of inactivity and there was not a revival until the 13th century when the municipalities appointed physicians, surgeons, oculists, lithotomists, and midwives. They were to be found established in France, Germany, the Netherlands, and in Switzerland, but the lecturer had been unable to find that the movement extended to England. In Italy, Sweden, and Norway at the present time one doctor in three is a municipal physician.

In Great Britain the prevailing characteristic has been the gratuitous service for the poor, of which the first example by an organised body was in the charter in 1599 of the Faculty of Physicians and Surgeons of Glasgow, which pledged them "to give counsell to puir disaisit folk gratis." The phrase social medicine was first used in France just one hundred years ago during the 1848 Revolution.

1797-1947

FEW firms can claim that their business has been handed down for 150 years in unbroken succession from father to son; and surely there is only one board whose nine members share a single great—or (in some cases) great-great—grandfather. Howards & Sons [1] look back in this intimate way to Luke Howard, their Quaker ancestor, born in 1772. At 15 Luke was apprenticed to a pharmaceutical chemist in Stockport, where he received salutary advice by letter from his father: ". . . dost thou rise at seven in the morning, dost thou bend thy mind attentively to business, dost thou cheerfully ask leave for every absence and give a faithful account of thy time." He bent his mind attentively, and founded the firm which his namesakes, in such profusion, still control. Howards' ether was famous nearly fifty years before ether was used as an anæsthetic, and Howards' aspirin is known to every admirer of Bateman. Cinchona studies were made by Joseph Jewell, partner of Luke, and by many members of the Howard family, especially by Luke's son, John Eliot Howard, who was one of the world's foremost quinologists, and a fellow of the Royal Society. Study of the cinchona alkaloids was carried on by David Howard, his nephew, founder and president of the Society of Chemical Industry and the Royal Institute of Chemistry. Of the nine present members of the board, seven bear the name of Howard, and two had Howards for their mothers. Seven of these directors

1. Howards 1797–1947. Published by Messrs. Howards, of Ilford at the 150th anniversary of the firm.

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were at Marlborough and five served with the Artists Rifles in our century's wars. During the air-raids of 1940, bombs fell on the works, and James Howard, a distinguished chemist who was doing important work on quinine for the Government, was killed. Later the factory again suffered when a V1 fell on it in 1944. The remains of this projectile were converted into sulphate of iron tablets, which were later sent to the devastated countries—an example of Howards' capacity for making good.

FILM ON CURARE

A FILM has been made by the Wellcome Film Unit to demonstrate the pharmacology and clinical use of *d*-tubocurarine chloride in shock treatment and anæsthesia. Carefully devised and beautifully illustrated in colour, the production is a model of good technique in the field of instructional films; but since it sticks to essentials it offers little that is new to those at all familiar with the drug.

THE HOSPITALS YEARBOOK

THE 1947–48 edition of the *Hospitals Yearbook* contains familiar and valuable features in its summary of hospital finances and its directories of hospitals and associated organisations. To these is now added a directory of rehabilitation services setting out the resources in each hospital region. In an editorial review Mr. J. P. Wetenhall examines administration of the hospital service under the National Health Service Act. The yearbook is published by the British Hospitals Association, 52, Green Street, Park Lane, London, W.1.

MEDICAL FILMSTRIPS

THE Royal Society of Medicine and the Scientific Film Association met jointly on Feb. 12 for a discussion on "Making your own Medical Filmstrips." Mrs. Helen Coppen (Institute of Education) explained that the filmstrip is a collection of still pictures assembled in logical sequence on standard cinematograph film to provide illustrations to a theme. The pictures are projected on to the screen with a projector specially designed to accommodate the small image sizes, of which two are in common use: single-frame 18×24 mm., and double-frame 24×36 mm.; the latter is preferable for home-made strips. Describing how he makes filmstrips, Dr. R. N. Tattersall (Leeds) explained that the proposed subject is first considered by a group representing everybody who is likely to use the finished strip. Items to be demonstrated are then embodied in a careful script providing instructions to the photographer. Dr. Brian Stanford outlined some photographic aspects of production. The subjects may be X-ray photographs, line drawings, printed matter, or bromide prints, which have widely differing contrast ranges. To produce a clean strip, the entire tone range of the positive film should be filled; so it is best to take each subject on the film stock best suited to its tone range, and then to make the finished strip by copying the negatives with a Leica camera. Since, however, the most suitable conditions rarely prevail, the subject should be restricted to five basic tones—black, dark grey, mid grey, light grey, and white.

SHAKESPEARE'S SON-IN-LAW

IN *The Shakespeare Circle*[1] Dr. C. Martin Mitchell, of Stratford-on-Avon, has written a life of Dr. John Hall, Shakespeare's son-in-law, who lived in the town from about 1600 to 1635—that is, from the time he was 25 till his death. Unfortunately, facts are scanty: it is even uncertain whether Dr. Hall ever lived at "Hall's Croft," though Dr. Mitchell, confident in its fitness, publishes a photograph of this charming house as a frontispiece to his book. It is known, however, that Hall was educated at Cambridge, and spent some time in France, that he settled in Stratford, married Susanna, Shakespeare's wise and capable daughter, lived for 20 years at Shakespeare's "New Place," which Susanna inherited, collected many case-notes (now in the British Museum), some of which were later published as *Select Observations*, refused a knighthood, grew quarrelsome in his old age, and died, possibly of an infection current among his patients at the time. With such slender materials Dr. Mitchell does his best to present Dr. Hall in the round; and it is perhaps ungrateful to say the result owes more to speculation than the critical reader could wish. It seems that in therapeutics Hall was abreast—or even in advance—of current practice; and his particular success in treating scurvy Dr. Mitchell ascribes to his massive use of herbs. In this he may be right; but the only evidence he gives is the case of Mrs. Wagstaff, treated with a prescription of 17 unspecified herbs "beaten, boiled and strained." How much ascorbic acid survived this treatment it is not possible to guess. Other cases quoted from the *Observations* show the doctor to have been industrious, confident, and a scrupulous note-taker; and though the book has some tantalising omissions it is a lively account of Shakespeare's family and friends, presenting Stratford as a bustling place rather than a lifeless "still."

1. Birmingham: Cornish Brothers. Pp. 116. 12s. 6d.

University of Oxford

Dr. G. S. Dawes has been appointed director of the Nuffield Institute of Medical Research.

University of Cambridge

On Feb. 14 the following degrees were conferred by proxy:

M.D.—H. M. Woodman.
M.B., B.Chir.—M. G. H. Lewis, K. L. Williams, J. H. Angel, G. M. Woodwark, J. S. Jenkins, J. D. G. Turner.

University of Birmingham

Dr. J. R. Squire has been appointed Leith professor of experimental pathology and director of the department of pathology.

Dr. Squire, who is 32 years of age, was educated at Westminster School, Caius College, Cambridge, and University College Hospital. After taking his M.B. in 1939 he held house-appointments at U.C.H. In 1941 he took the M.R.C.P., and the following year he joined the R.A.M.C., serving for a time with no. 1 medical research section, Home Forces, till he was appointed to the staff of the scientific adviser to the Army Council. In 1943 he was posted to Burma as medical specialist to an operational research unit, and in 1944 he was put in charge of the biological research section of South East Asia command. After demobilisation in 1946 Dr. Squire became director of the Medical Research Council's industrial medicine research unit at the Birmingham Accident Hospital. He is also a member of the M.R.C. occupational medicine committee and of their toxicology committee. In 1940 he published a paper on blood quantity in skin, but his war-time research work has not yet been released by the Army Council.

Dr. J. W. Orr has been appointed to the second chair of pathology.

Dr. Orr, who is reader in experimental pathology and assistant director of cancer research in the Leeds School of Medicine, qualified in medicine at Queen's University, Belfast, in 1923, and the following year he took his B.SC. with first-class honours in pathology. He was awarded the gold medal for his M.D. thesis in 1926. After holding the Musgrave studentship and Riddell demonstratorship in pathology at Belfast, he was appointed first assistant in the department of pathology at St. Mary's Hospital, London. His published work includes papers on multiple malignant neoplasms, changes in the spleen in experimental streptococcal infections, and changes in mouse skin induced with carcinogenic hydrocarbons.

Dr. J. R. Gibson has been appointed lecturer in social medicine, and Dr. J. M. Mynors assistant lecturer in anatomy.

University of Leeds

Dr. D. N. Ross has been appointed a research fellow in rheumatism, Dr. E. C. Allibone a clinical lecturer in pædiatrics, and Dr. W. Goldie lecturer in pathology.

University of Sheffield

Dr. C. E. Davies has been appointed research assistant in clinical medicine, Dr. T. Stapleton tutor in child health, and Dr. A. Jordan honorary lecturer in clinical biochemistry.

Southern Counties Medical Exhibition

This exhibition will be held at the Polygon Hotel, Southampton, on April 20, 21, and 22. A programme of medical films will be shown from 3 P.M. each day.

Society of Chemical Industry

The food group and microbiological panel of this society will hold a meeting at Burlington House, Piccadilly, London, W.1, on Wednesday, March 10, at 6.15 P.M., to discuss the Microbiological Control of Therapeutic Products.

C.M.F./M.E.F. Physicians

A reunion dinner will be held at the Apothecaries' Hall on Saturday, April 10. Anyone interested should write to Dr. A. Willcox, the hon. secretary, 66, Harley Street, London, W.1.

Harveian Society of London

On Wednesday, March 17, at 8.30 P.M., at 26, Portland Place, W.1, Dr. Th. Alajouanine, professor of neurology in the faculty of medicine in the University of Paris, will deliver the Harveian lecture, on Aphasia and Artistic Realisation.

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Tudor Edwards Memorial Fund

This fund will be closed on March 31. Till then donations may be sent to the treasurer, Lord Courtauld-Thomson, at Brompton Hospital, London, S.W.3.

Poliomyelitis Conference

Official delegates from more than sixty nations, says B.U.P., have been invited to attend the first International Poliomyelitis Conference, to be held in New York from July 12 to 17. The conference is being organised by the National Foundation for Infantile Paralysis.

Royal Photographic Society of Great Britain

The medical group of this society will hold an exhibition of photography at 1, Wimpole Street, London, W.1, from May 24 to 29. The closing date for entries is April 24, and further particulars may be had from the hon. secretary of the group, 16, Princes Gate, S.W.7.

Marriage Guidance

The Home Secretary has appointed a departmental committee to consider on what lines marriage guidance as a form of social service can best be developed in England and Wales if assisted by Exchequer grants, and to advise on what basis Exchequer grants could properly be made to this service. The members of the committee are: Sir Sidney Harris (chairman), Mrs. E. G. M. Barlas, Mr. G. E. Haynes, Sir Edwin Herbert, Dr. Edward Larkin, and Miss W. M. Goode. Miss P. Boys-Smith, the secretary, may be addressed at the Home Office, Whitehall, S.W.1.

London Regional Tuberculosis Society

Representatives of the various tuberculosis societies in the North-west Metropolitan region have lately met with a view to forming a society to be known as the North-West Metropolitan Regional Tuberculosis Society. Membership will be open to practitioners engaged whole-time in the tuberculosis services in the region; and associate membership will be open to those working part-time. A meeting of those interested will be held at Kensington Town Hall, High Street, W.8, on Tuesday, March 16, at 7 P.M.; and further information is obtainable from Dr. C. P. Hay at the same address.

Births, Marriages, and Deaths

BIRTHS

BRAY.—On Feb. 19, the wife of Dr. John Bray—a daughter.
HARTLEY.—On Feb. 14, the wife of Dr. C. E. Hartley—a daughter.
HUDSON.—On Feb. 18, in London, the wife of Dr. J. R. Hudson—a daughter.
HYLTON.—On Feb. 19, at Clevedon, Somersetshire, to Dr. Lorna Hylton, wife of Dr. William Hylton—a daughter.
LUND.—On Feb. 9, at Johannesburg, to Elizabeth Lund, M.B., wife of Mr. Maxwell Lund, F.R.C.S.—a daughter.
MACDONALD.—On Feb. 14, at Coulsdon, the wife of Dr. I. D. MacDonald—a son.
RETTIE.—On Feb. 20, the wife of Dr. G. K. C. Rettie—a daughter.
WIRGMAN.—On Feb. 13, in London, the wife of Dr. R. E. Wirgman—a daughter.

MARRIAGES

COLLARD—ROBERTSON.—On Feb. 7, in London, Patrick J. Collard, M.B., to Jessie Robertson, B.M.
GILMORE—MUIR.—On Feb. 20, at South Woodford, Haldane Carson Gilmore, L.R.C.P.I., to Margaret MacIntosh Muir (née Archibald), M.B.
HEATHCOTE—CADMAN.—On Feb. 19, Reginald St. A. Heathcote, F.R.C.P., to Mrs. Amy Cadman (née Howson).
KRAFFT—JOHNSTON.—On Feb. 3, at Prittlewell, Essex, Dr. Gerard Krafft, to Dr. Catherine Vallance Johnston.
MILNE—RAWLINSON.—On Feb. 11, at Halifax, Robert Marshall Milne, M.B., to Elizabeth Margaret Rawlinson, S.R.N.
STEIN—RACHWALSKY.—On Feb. 22, in London, G. E. Stein, major, R.A.M.C., to Lora Rachwalsky, M.B.

DEATHS

CREASY.—On Feb. 20, in London, Rolf Creasy, M.R.C.S.
DALZIEL.—On Feb. 21, in London, John McEwen Dalziel, B.SC. M.D. Edin., D.T.M.
DROOP.—On Feb. 15, at Tilford, Surrey, Charles Edward Droop, M.A., M.B. Camb., aged 70.
FAIRLIE-CLARKE.—On Feb. 16, Allan Johnston Fairlie-Clarke, M.A., M.CHIR. Camb., F.R.C.S., aged 70.
HARRIS.—On Feb. 16, at Ramsgate, Robert James Harris, M.R.C.S.
HENERY.—On Feb. 16, in London, John Philip Edmund Henery, L.M.S.S.A.
SOLLY.—On Feb. 19, at Exeter, Reginald Vaughan Solly, M.D. Lond., M.R.C.P., F.R.C.S., aged 83.
WALES.—On Feb. 16, at Whalley, Herbert Wales, M.A., M.B. Camb., aged 70.
WALKER.—On Feb. 18, at Bradford-on-Avon, Henry Secker Walker, M.SC. Leeds, F.R.C.S., aged 84.
WINCKWORTH.—On Feb. 20, Wadham Bruce Winckworth, M.R.C.S., aged 79.

A Lecture at Harvard

Dr. W. N. Pickles, medical officer of health for Aysgarth, Yorkshire, will deliver the Cutter lecture on preventive medicine at Harvard University school of public health, Boston, Mass., on April 12. Dr. Pickles has chosen as his subject Epidemiology in Country Practice.

Society of Chiropodists

The annual convention of the society will take place on April 22, 23, and 24. Sir Alfred Webb-Johnson, P.R.C.S., will open the convention on Thursday, 22nd, at 2.30 P.M., and other speakers will include Mr. Norman Lake, Prof. F. Wood Jones, F.R.S., and Dr. Reginald Brain. All the meetings with the exception of Prof. Wood Jones's lecture, which will be given at the Royal College of Surgeons, will be held at Friends House, Euston Road, N.W.1.

Association of Sea and Air Port Health Authorities of the British Isles

The annual meeting of the association will be held at Swansea on May 12, 13, and 14. The speakers will include Dr. N. Gebbie (the Romance of the Port Health Service), Surgeon Captain H. M. Willoughby (Experiences of a Naval Hygiene Officer 1939–47), and Dr. R. Barrett (the Egyptian Cholera Outbreak, 1947). Further information may be had from Dr. H. C. Maurice Williams, Health Department, Civic Centre, Southampton.

Dr. Robert Platt, professor of medicine in the University of Manchester, is visiting Hungary, on behalf of the British Council, to lecture on kidney diseases and high blood-pressure.

Diary of the Week

FEB. 29 TO MARCH 6

Monday, 1st

ROYAL COLLEGE OF PHYSICIANS, Pall Mall East, S.W.1
5 P.M. Dr. P. M. F. Bishop: Hormones in Medical Practice. (First lecture.)
ROYAL COLLEGE OF SURGEONS, Lincoln's Inn Fields, W.C.2
5 P.M. Mr. R. J. McNeill Love: Biliary Apparatus. (Erasmus Wilson demonstration.)
MEDICAL SOCIETY OF LONDON, 11, Chandos Street, W.1
9 P.M. Dr. C. E. Dukes: Clinical Pathology in Relation to Medical Practice. (Third Lettsomian lecture.)

Tuesday, 2nd

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. W. Russell Brain: Treatment of Paraplegia.
INSTITUTE OF DERMATOLOGY, 5, Lisle Street, W.C.2
5 P.M. Dr. I. Muende: Pathological demonstrations.
UNIVERSITY COLLEGE, Gower Street, W.C.1
5 P.M. Mr. L. E. Bayliss, PH.D.: Some Aspects of General Physiology. (First of four lectures.)

Wednesday, 3rd

ROYAL COLLEGE OF SURGEONS
5 P.M. Mr. P. H. Mitchiner: Enlargement of the Testis and Epididymis. (Erasmus Wilson demonstration.)
ROYAL INSTITUTE OF PUBLIC HEALTH & HYGIENE, 28, Portland Place, W.1
3.30 P.M. Mr. S. E. T. Cusdin, A.R.I.B.A.: Planning of a Modern Hospital in Relation to the Public Health.
MEDICO-CHIRURGICAL SOCIETY OF EDINBURGH
8.30 P.M. (7, Drumsheugh Gardens.) Sir David Henderson, Mr. G. L. Alexander: Physical Methods of Treatment in Psychiatry with Special Reference to Leucotomy.

Thursday, 4th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. T. C. Hunt: Diseases of the Colon with Special Reference to Ulcerative Colitis.
ROYAL COLLEGE OF SURGEONS
3.45 P.M. Prof. M. Greenwood, F.R.S.: Simple Statistics of Cancer. (Imperial Cancer Research Fund lecture.)
ROYAL PHOTOGRAPHIC SOCIETY, 16, Prince's Gate, S.W.7
7 P.M. *Medical Group.* Dr. C. Hamilton Wilkie: Application of Medical Photography to Venereal Disease.
MEDICAL SOCIETY OF THE L.C.C. SERVICE, County Hall, S.E.1
4.15 P.M. Dr. E. N. Allott, Dr. C. A. Holman, Dr. A. G. Signy: Recent Developments in Connexion with Blood-transfusion.
INSTITUTE OF DERMATOLOGY
5 P.M. Dr. B. Russell: Diseases Affecting the Lips and Mucous Membranes.
INSTITUTE OF LARYNGOLOGY & OTOLOGY, 330, Gray's Inn Road, W.C.1
5.30 P.M. Mr. G. Ewart Martin: Acute Otitis Media.

Friday, 5th

ROYAL COLLEGE OF PHYSICIANS
5 P.M. Dr. J. Forest Smith: End-results of Upper Respiratory Infection in Children.
ROYAL COLLEGE OF SURGEONS
5 P.M. Dr. L. W. Proger: Giant Cells. (First of two Erasmus Wilson demonstrations.)
LONDON CHEST HOSPITAL, Victoria Park, E.2
5 P.M. Mr. J. W. S. Lindahl: Sinus Infection in Chest Disease.

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DENTAL DEPT.

Sep 9 '53

May 5 '65

Sep 2 '65

Dec 20 '65

Feb 7 '66

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